ELECTRICAL REVIEW

[ILLUSTRATED.]

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The Thomson Incandescent Dynamo.

We illustrate on this page the new incandescent dynamo invented by Prof. Elihu Thomson, of the Thomson-Houston Electric Company, and built for the Consolidated Electric Light Company (Sawyer-Man system), of this city. The dynamo is automatic, compound-wound, and the engraving, Fig. 1, represents the 150-lighter. The work of this machine has given complete satisfaction in every instance, and the owners state that so perfect is its regulation that the light in the remaining lamp will not vary, though every lamp but one be cut off. The rapidly increasing business of the Consolidated Company receives an additional impetus in the invention of this machine.

In Fig. 2 is shown the shunt-wound dynamo of the Consolidated Company; an excellent machine, and one that is not unfamiliar to the electric lighting field.

The Consolidated Company recently placed an excellent incandescent plant of 100 lamps in the main exchange of the New England Telephone and Telegraph Company, on Pearl Street, Boston, and this union of two electrical systems that have been possessed in the past with more or less antipathy for each other, is most satisfactory. We believe this exchange is the first to be lighted entirely by the incandescent light, but have no doubt that there will soon be many others.

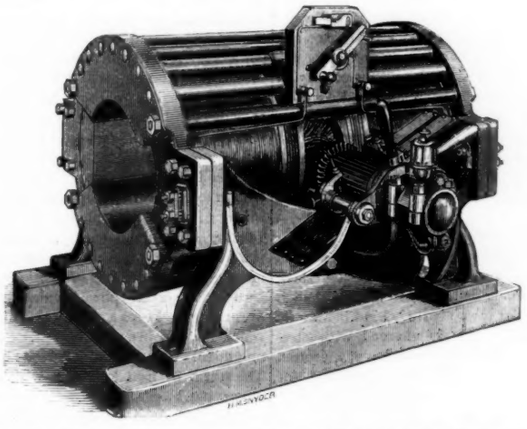


FIG. 1.—THE THOMSON INCANDESCENT DYNAMO, BUILT FOR THE CONSOLIDATED ELECTRIC LIGHT CO.

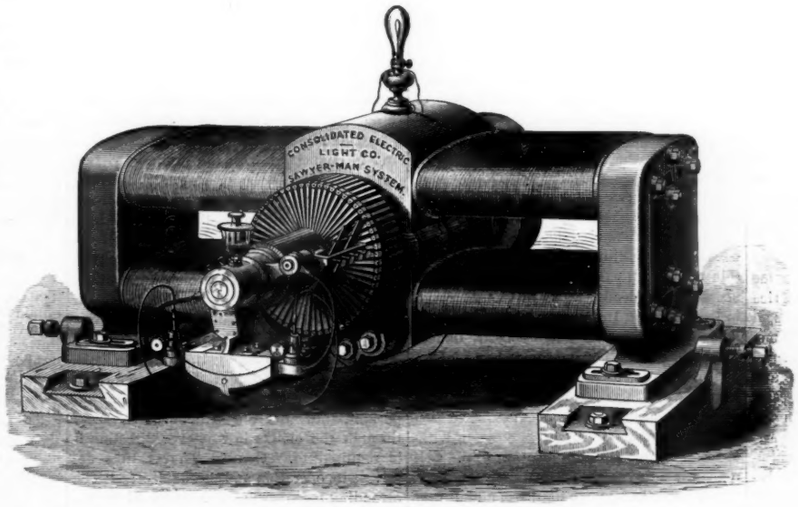


FIG. 2.—DYNAMO OF THE CONSOLIDATED ELECTRIC LIGHT CO

With the Inventors.

GENERAL MENTION OF SOME CURIOUS AND INTERESTING DEVICES AND MECHANISMS, CHIEFLY ELECTRICAL.

Many years ago, when the Pennsylvania Railroad was in its infancy, the question of making the cars more comfortable was brought before the board of directors. One of the members, a solid and conscientious old Quaker, objected to such a course, so the story goes, on the ground that it would encourage people to leave their work and travel. This same old gentleman, were he living to-day, might protest that many of the inventions in applied science now making, looking to lightening our labors and enlarging our conscience were more harmful than beneficial. The merchant instead of hurrying down the street to confer with a brother merchant as in the old way, now calls him up with an electric bell and talks to him through the telephone. Our old friend, the Quaker, would perhaps say that it were better for the merchant that he took the run down the street, to which the merchant would doubtless respond that he got quite enough exercise during the day as it was, and that the telephone and similar contrivances enabled him to transact his business more expeditiously and in greater volume.

There is, no doubt, some truth in the old belief that labor-saving machines make men neglectful and lazy, but the benefits derived from these mechanisms are so great as to far overbalance what mischief may come from their use. Indeed, it would not be difficult to show that the conduct of the business office of to-day is quite as thorough and precise as of yore, while at the same time operations, though far more extensive, are conducted with greater expedition. The modern office receives the market reports by electricity, and is connected by the same natural force with thousands of other offices, any of which, no matter how far removed, may be communicated with at a moment's notice. Lamps have given place to gas and gas to the electric light. The merchant was long since relieved of the labor of writing scores of letters a day by the appearance of the stenographer who took down his words as they fell from his lips, and afterward transcribed them on letter paper for the mail. But this was not perfect enough. Inventive genius brought forth the typewriter, and the merchant's letters went first into a stenographic note book, and afterward into print. To the ordinary mind this would seem to be the very acme of perfection, and no other means of improvement would appear either possible or necessary. Perfection, however, is only a comparative term. Nothing is perfect in the work of man—all may be improved. To Professor Edison the labor of the man of business in having continually to call for his stenographer and amanuensis to take down his correspondence and to tax his memory with what it occurs to him to say to his partners in private has seemed too onerous to be borne. His sympathy once thoroughly aroused, he bethought him of his once famous phonograph, now rarely used outside of the laboratory and lecture room, and a series of experiments with this extraordinary mechanism assured him that it could be made to surpass the stenographer in tractability and efficiency. The stenographer can only take down words in a language which he alone can interpret, but the phonograph can photograph not only the words out the sounds of the words, the voice and intonation and emphasis of the speaker, and all this in a language that anybody can understand. Having improved the phonograph to such an extent as to make it a practicul contrivance for the affairs of everyday life, Edison now proposes to make it take the place of the stenographer in business offices. With a phonograph at his side Edison says that the business man will be able to dictate his correspondence at his leisure. When important ideas occur to him he can whisper them into the ear of the phonograph, and when his partners come in they can hear them repeated in his own voice, whether he be present or absent. A small electric motor being connected with the phonograph, any clerk, by turning an electric switch, can have the correspondence repeated to him as slow or as fast as he chooses to transcribe it, and, should he make any mistake in the transcription he has but to turn the instrument back in order that what he has missed shall be repeated to him.

Some other new instruments to save time and trouble and add to the conveniences of life are the telethermometer, telebarometer, telemanometer and the telehydrobarometer. All these are electrical and, as their names would imply, are designed to indicate distant conditions. The telethermometer furnishes the brewer, malster, oil, sugar refiner, warehouseman and so on with a constant check upon the superintendence of their employes. The instrument, connected with the several apartments or cellars by wire, is hung upon the wall of his office. So are the other instruments that have been named. The telehydrobarometer will record in a single office the height of ponds, akes and the various sections of rivers and canals. The telemanometer automatically records the pressure in boilers, so that a manufacturer can always tell by looking up at the wall of his office whether or not his engineers are obeying his orders regarding the amount of steam they are to keep up. The telebarometer records electrically barometric pressures and relative humidity.

A certain amount of cool judgment is, however, required in the use of these electrical indices. A nervous man might be thrown into consternation by the sudden discovery that the telethermometer indicated that the temperature of his cellar had fallen to 20 degrees Fahr., and that of his parlors was at freezing point, while, notwithstanding this, a personal investigation would show that the furnace fire was not out nor the front door open. It was only burglars climbing in the one and a healthful airing taking place on the floor above.

The latest thing in motors is what is called the ice bicycle, though more properly it is a unicycle, for it has but one wheel, though

there are two runners. The wheel has sharpened cogs, and is set immediately under the body of the vehicle. The feet work upon treadles, and the power thus generated is transmitted to the cog-wheel, which in effect is a driving-wheel. The rider sits upon a comfortable seat, the feet being employed as in a tricycle, and the steering is done by means of a lever. Ice offers so little resistance to a runner or skate that it is possible to obtain great speed with this unique sled.

While it cannot be said that the road bicycle is usurping the place of the horse, the electric tricycle which has recently made its appearance in England furnishes an excellent substitute for that noble animal, and possesses many advantages over him. It requires no stable and no groom, no food nor water. It does not fall sick, is never balky, will not run away or throw you off. Unlike the bicycle, it requires neither skill nor exertion to manage it. Two, and even three, people can ride upon it at the same time. It consists of a body set upon three wheels—two drivers and a steering-wheel. Behind and underneath is an electric storage battery, which furnishes the power of propulsion. You have but to turn a little electric switch, and off you go. Descending a hill, you turn off the current and apply the brake.

Those who ride for pleasure may, perhaps, object to the tricycle because it does not furnish, as the horse does, the vigorous jolting that, it is alleged, helps digestion. No doubt, in the near future, a special description of tricycles will be furnished for the use of such objectors. Such a tricycle could readily be constructed by applying the hobby-horse principle, which would have all the jolting motion of the old style horse—that is, the live animal—while, at the same time, having none of its viciousness—that would not shy at the sudden appearance of a white stone at the side of the road, nor rear and plunge at the sight of a locomotive.

We have seen that machinery is rapidly taking the place of man in the workshop, and that there has already appeared a substitute for the horse. The substitution of machinery labor for hand labor has engrossed many ingenious minds, and some success has been scored in making machines do the work of horses and oxen in drawing loads. The steam carriage now used on some of the level English post-roads and the ponderous iron roller for smoothing roads and park walks are examples of their handiwork. The boldest, however, have not heretofore had the temerity to even attempt to substitute machinery for the cow in producing milk. But a French journal, *Bulletin des Invent-ons*, recently declared that such a substitute for the cow has been found. Curious to learn the name of this ingenious inventor and the character of the machine, we struggled with the French dictionary and the article in question, now searching in the one and again looking at the other. We were rewarded by the discovery that the invention had been made in America, and the mechanician's name Goodwink. Now we came from America ourselves, and yet have not up to the present writing heard of Mr. Goodwink or of his mechanical cow, which the French journal says, being supplied with grasses and salt and water, will perform the same processes of lacteal manufacture that takes place in and are superintended by the cow. Perhaps Mr. Goodwink is keeping his invention to himself, though it seems more reasonable to believe that the French paper has taken some humorous article from a Western American contemporary, and treated *au s rieux*.

But if an artificial cow is not an actuality, it is certainly true that science has found a substitute for the milk-maid and the dairy-maid, for recent Patent Office reports show several inventions by the use of which cows can be automatically milked, and there is now in use an electrical contrivance by which the cream can be at once separated from milk without adopting the usual settling process, and this cream turned into butter. A dynamo machine is used to generate the electric current, and the two electrodes are placed directly into the milk. The effect is to separate the fatty particles from the water, and finally to collect all the solids into one homogeneous whole, the result being pure butter—at least it is so described. Now that our inventors have proceeded so far in the substitution of mechanism for live forms, it is to be hoped that they will not rest until they have found a mechanical dog that cannot develop mange and rabies, and a cat that can meet her companions in the back-yard or upon the back-fence without giving vent to her feelings in uncanny and sleep-disturbing wails

Of all recent discoveries, that regarding the use of the telephone on the ocean seems to be by long odds the most important, and if its possibilities are really as great as now they seem, the deep sea telephone may yet come to be regarded as one of the greatest discoveries of this century. To Professor Trowbridge belongs the honor of having worked out the problem of telephoning between ships on the high seas, though others have taken up the principle and elaborated it. But the honor of such a discovery would seem to properly belong to him who conceived the idea or recognized the principle when it was before him.

Water, though by no means one of the best conductors of sound, is nevertheless, a conductor and many of us found this out to our sorrow when, as boys, we ducked our heads under the water and struck two rocks together, receiving as a result a shock on the tympanum of the ear that made further experiments of the same kind unnecessary to assure us of the fact. Water is also a conductor of electricity and it was this fact that seems to have led Professor Trowbridge to believe that the ocean water could be made to form a part of a telephone circuit. He made the experiment and found such to be the case.

Practically the system works as follows: If a ship having a dynamo electric machine aboard—and all the big steamers have these to furnish them with electric light—if such a ship trails or tows a wire behind her a mile long, and the same is charged with electricity, then the wire will have a ground connection or practically the same thing, for the water, it has been found, will furnish it. Now if a telephone is connected with the ship end of the wire this end will be positive and all the water about the ship within a circle having a radius equal to half the length of the wire will be positive. The other end of the wire and for the area of a circle having a similar radius the water will be negative. If, now, another ship having a trailing wire, charged by a dynamo electric machine and similarly connected with a telephone, comes within the influence of electrically charged water, the electrical bell attached to its telephone will ring, and though it is the darkest of nights, or the thickest of fogs prevails, telephonic communication between the two ships may be had, and thus a possible collision averted. If this is a practical system, and it seems to be such, the trailing of three or four miles of thin wire by all passenger steamers, with the necessary connections aboard, would result in freeing ocean travel from what may safely be looked upon as its chiefest peril—danger from collision. The ocean steamer of to-day is a great improvement upon that of twenty years ago. It has water-tight compartments, and any one of these, save that abaft the mizzen-mast, may be stove in without destroying the life of the ship. Self registering thermometers indicate the presence of fire in any one of these, and it may be instantly flooded with water. But, notwithstanding these and many other improvements in naval architecture, the same danger from collision that threatened steamers when first they sailed the seas threatens the steamers of to-day. There is only the warning steam whistle to guard against collision in fog and thick weather, and, if the winds are blowing strongly, only that vessel which is to leeward can hear the sounds, and from the varying of these ocean winds the sound may come from one direction at one moment and from another at the next. But if a skipper had such an apparatus at hand as that described above, and could talk with the skipper of an advancing ship through a telephone, the danger from collision would be reduced to a minimum. The two masters would learn the courses of their respective ships, and thus be enabled to lay their plans to avoid a meeting.

A unique project is afoot to light up a great pleasure ground on Staten Island so that games of base ball, tennis and cricket may be played as well by night as by day. Several thousand small electric lights are to be placed in trenches in the ground; these trenches to be covered with stout wire netting placed on a level with the surrounding portions. The class of light to be used is the incandescent, which burns, or rather glows, in a vacuum and hence cannot set fire to anything. Indeed, there is no fire in these little incandescent globes, for, from the nature of the light, there is no combustion going on. On this ground play will not be forced to end at sundown, but may be continued as long as desired.

From present appearances the wars of the future will have to be conducted by scientists. The submarine torpedo boat, as at present constructed, navigates the depths of ocean with the fishes. It will take its crew of men directly under the bottom of a hostile ship, and is so arranged that they can affix a death-dealing torpedo to the same and then move away, and though it be bright daylight those aboard the ship will not know that an enemy has visited them. On land the machine gun recently invented by the American, Hiram Maxim, will stand and deliver its terrible hail of shot without the attendance or even the presence of a single human being. This wonderful gun loads and fires itself automatically, the power generated by the recoil of the gun having been utilized by Maxim to perform both operations. Imagine a row of such guns placed before the advancing lines of an enemy. Each can fire six hundred rounds of heavy shot in a minute without the fear of overheated tubes, because the same power which loads and fires the gun keeps a steady column of cool water flowing over the barrels. There are no gunners to be intimidated or shot down. The storm of iron keeps on with the same unvarying intensity, and as the guns can be so arranged as to sweep a semi-circle, no living thing can approach them and survive.

To make the life of a supposed enemy still more intolerable, General Thayer, United States Army, has recently invented what he calls a dirigible balloon, which will not only rise into the clouds, but will go whithersoever its pilot chooses to direct it. This balloon is exciting no little interest among military authorities both here and abroad, the English having sent over a special military agent to report upon its value as warlike apparatus. There are two forms of these balloons: The first is connected with the ground by two cables which can be quickly strung over standards or posts having wide stretching arms. Over these cables the balloon is hurried along across hills and valleys and rivers, being impelled by the electrical energy running through the cables, which are conductors. A picture of this form of balloon shows several score of soldiers with machine guns being hurried to the front in a country where there are no railroads.

It is the second form of this balloon, however, which is the most interesting and important. In this the balloon sails freely through the clouds in whatever direction it is required to. General Thayer thus describes its operation and mechanism: "The ascending force, as usual, is obtained by the use of hydrogen. One of the motors for propelling the independent air-ship consists of a high-speed air-compressor, coupled directly to a specially devised carbonic acid gas engine. This is connected with a reservoir placed underneath the platform or deck on which the machinery is located. Compressed air is forced into this reservoir, or vapor is allowed to flow into it, until the required pressure per square inch is obtained. The rear end of the reservoir is so arranged that, at given intervals of time, the confined energy is suddenly released, thus producing a powerful forward thrust. By the use of the gas engine, the necessity of coal and water or weighty appliances is obviated. The other motor consists of a powerful wheel, which effects the continuous discharge of a large volume of air through a nozzle pointed sternward. This develops a powerful propelling force. If a hollow truncated cone be placed over the nozzle, the discharge of the blast draws in outside air through the annular opening, and by imparting velocity to it increases the volume of the discharge, and decreases its velocity. The use of several such conical tubes, one outside the other, considerably increases the efficiency of the motor. In experiments with water, the addition of five cones to the discharge tube gave an increase of 50 per cent. The force of this motor is not true reaction, as usually interpreted, but the recoil action induced by the discharge of matter at a high velocity in an opposite direction. The buoyant part of the balloon is made of superposed tissues of strong silk and rubber, and is at all times perfectly inflated, so as to be taut and rigid. Broad bands are used in preference to netting for the support of the deck. The discharge nozzle is fitted on a ball and socket joint, which permits it to be moved in any direction at pleasure. The man at the wheel controls the direction of the nozzle, and thus steers the balloon without the necessity of other rudder. In the interior of the buoyant portion of the structure is placed a large silk sack connected with the air compressor on the deck. A pipe leads from the exterior envelope to the tube leading to the nozzle at the stern. Both of these pipes are provided with cocks which can be opened or shut at pleasure.

"Four cylinders filled with compressed hydrogen stand on the deck, and are connected with the interior of the exterior envelope. By withdrawing hydrogen from the exterior envelope and forcing air into the interior sack, the buoyancy of the balloon is diminished without altering its form and the ship descends. The reverse of this operation—withdrawing air from the sack and forcing hydrogen into the exterior envelope—increases the buoyancy and causes the balloon to ascend."

The particular purpose of such an air-ship is to sail over the enemy and drop dynamite bombs upon him. No army, General Thayer thinks, would be safe in the field with such a monster as this balloon hovering over it, and if it is true that large quantities of explosives could be dropped with accuracy from a great height and with such careful timing that they would explode at the proper time, he would seem to be right.

It should be said, however, that the most extraordinary thing about this air-ship is that it should have attracted such serious attention before it has even been experimentally tried. To the ordinary mind it seems strange that General Thayer, though as his words would imply, having the utmost confidence in his air-ship, does not take an excursion into the clouds with it himself to test its practicability, or, if his confidence in his invention does not extend so far, he might hire some other equally enthusiastic and more confident person to make the venture for him.—*F. H. N. in Brooklyn Eagle.*

The Electric Lights in Holyoke.

It is a little over a year since the electric lights were introduced into Holyoke and the public would now feel loth to have the light removed. In December, 1884, the Water Power Company put up eighteen lamps in public places. The Holyoke Electric Light and Power Company was formed and by April 1st, 1885, the city government decided to have the light supplied at the city's expense and for the nine months remaining of 1885 paid $4,000 for the use of fifty electric lights, twenty of which burn all night. The charge is sixty-five cents per light per evening if burned all night and fifty cents each till midnight. The lights are lighted at sunset. The light has constantly grown in popularity and now the company have over seventy-five in stores and fifty in the street, besides three at South Hadley Falls. The system is the Schuyler (arc) and each light is of 2,000 candle-power. Many more lights are wanted and have been petitioned for. The company's plant is getting extensive. They have six dynamos, four of twenty-five horse-power and two of thirty horse-power. New carbons have to be substituted in each lamp every seven hours. As yet the company have none in private residences. Several mills in the city use the electric light but supply their own power independently. It should be said of the Schuyler system of light in use here that it has given excellent satisfaction. The selection of this system was fortunate. The light burns very steadily and agreeably which is not the case with some systems.—*Holyoke Transcript.*

Uniformity of Action of Dynamos.

Editors Electrical Review:

I notice one of your correspondents' comments upon the lack of uniformity in the action of electric dynamos and cites a case where one dynamo easily maintains forty-two lights, while another an exact duplicate in every respect, very poorly runs thirty-seven lights, both having been tested on the same circuit under similar conditions he asks "any scholar in the class to reply to the conundrum."

I don't think that he is a practical manipulator of the aforesaid animal, or his experience would have enabled him to locate the trouble.

It often happens that in shipping a dynamo a bolt in the field magnet will become loosened and thus create a consequent point, thereby weakening the generating effect. Again a "nigger" (a poor joint in field or armature) will develope and the great resistance thereof will cause trouble; and then a leak through bad insulation will shunt a portion of the current. These faults are liable to occur at any time to any make of dynamo. The following are faults produced by carelessness of builders:

Using iron for the fields having blow-holes and other defects in it, in which the limbs of the magnets differ in cross section, by which the poles are distorted and thrown out of proper position.

Carelessness in boring out the field, or winding the armature, allowing the clearance to vary too much, as the inductive effect is inverse as the square of the distance; a slight variation here will greatly affect the power of the dynamo.

Carelessness in drawing the magnet wire, and allowing the relative diameters of the armature and field wires to too greatly vary; sometimes a slight difference in the insulation will vary the power of the dynamo.

These are some of the leading causes for the trouble mentioned, but loose dirty connections are the cause of more trouble with all kinds of electric instruments than all other causes combined. Cleanliness is said to be next to godliness; in using electricity it is cleanliness or short circuit.

Respectfully,

FOREE BAIN.

Chicago, Ill., Jan 30th.

The Electric Light in Surgery.

Dr. Milton J. Roberts, professor of Orthopedic Surgery and Mechanical Therapeutics in the Post Graduate Medical School, has invented an instrument which he called the electro-osteotome. Last week he demonstrated the advantage of his discovery by performing one of the most difficult operations in economic surgery. The patient was a young man about twenty-two years old, a student in the Burlington (Vt.) Theological School. A few days before the holidays he fell on the college campus, but got up readily. He felt a sharp pain for a moment, but it wore away, and at night he had almost recovered. Two days later, when he was sitting in the lecture-room, he felt a sudden pain in the hip, which has not left him since that time. The sufferer was brought to this city and examined by a physician, who failed to find any cause for the trouble. He advised the young man to consult Dr. Roberts. The patient did so, and two weeks ago a bed was assigned to him in the surgical ward of the Post Graduate Hospital.

Dr. oberts Rthought that there was pus in the joint, and that it could be let out and the leg saved without sawing the joint away. The operation was performed in a small room on the top floor of the hospital. Dr. Roberts and three assistants were there early, and by the time the surgeons who had been invited to witness the operation arrived there was nothing left for them to do.

"How are you going to see the extent of the injury in the cavity of the bone?" asked one of them.

"I have provided for that little emergency," smilingly replied Dr. Roberts, and he held up a little incandescent electric lamp, not larger than a pea. "I intend to light up the cavity of the bone, and let you all look into it." Then Dr. Roberts described the odd-looking instrument that hung over the operating table. He called it an electro-osteotome. It consisted of a cylinder of hard rubber, about eight inches long and three inches in diameter. Inside was a powerful Rumkorff coil. From the bottom of the cylinder a slender steel shaft, three inches long, protruded. It was so constructed that as soon as the cylinder was connected with a battery of fifteen cells it began to revolve. Dr. Roberts said, when at full force, it made 12,000 turns in a minute. A current-breaker, by means of which the movements of the shaft could be regulated, was close to the handle, and required only a light touch to operate it. Ether was administered to the patient, and soon he was unconscious. The assistant washed the limb with an antiseptic solution, and Dr. Roberts laid a thigh bone, that had been dried and cleaned, over the injured leg. This was done to guide him in finding a big lump, known as the great tuberosity, which was the landmark in the operation. With difficulty he found it under the swollen tissues that hid it. Then he drove a long, keen scalpel into the muscles, and struck it plumb in the center. With two strokes he laid the flesh aside, and exposed the bone for a distance of five inches. An assistant lowered the plates of the battery, and Dr. Roberts adjusted a thin gimlet, like a cheese-tester, in the shaft He pressed it against the bone, which is extremely dense at that point, touched the brake, and a whirring sound was heard. In less than three seconds it bored into the bone, and the current being broken, it was drawn out again. Dr. Roberts scraped off some of the powdered bone that clung to it, and an assistant, Dr. Elliott, examined the specimen under the microscope. He announced the presence of pus cells, as Dr. Roberts had predicted.

This settled all doubt, and Dr. Roberts proceeded. He changed the gimlet for a larger one and then attached a steel drill, which bored a hole three inches in diameter in less than three seconds. After wiping away the blood, the operator introduced the little electric globe into the cavity. The surgeons bent down low and looked inside. The bright light illuminated the whole interior, and the bony structure could be clearly seen. Everything was as plain as if a streak of sunlight had entered. Without any difficulty the line of demarcation between the healthy and diseased bone was revealed; by means of cleverly-shaped chisels the diseased bone was cut away, and a canal dug to drain off the pus that might form in the future. In twenty minutes after the first cut was made the operation was completed, and only required the introduction of a drainage tube and bandaging. If nothing unusual occurs, the patient will be able to walk in ten days.

Tubbs' Thermostat.

This highly-sensitive thermostat, which will respond to a change of one-half degree, is well adapted for automatic fire alarms. The manufacturers, Messrs. J. H. Bunnell & Co., have had a great demand for these thermostats for this purpose, and also they have been found valuable in indicating temperature of incubators, masses of grain, etc. The thermostat can be adjusted to respond to any temperature required. An illustration of the improved form is shown in this edition.

A Correction in Amperes.

Editors Electrical Review:

In your issue of 23d inst. the statement is made that after a five hours' run the current from one battery dropped from 6 amperes to 1.39 amperes In the place of 1.39 read 5.4. Be kind enough to refer to this error in your next statement, for a drop from 6 to 1.39 looks pretty bad for one battery.

Very truly yours,

CHEMICAL ELECTRIC LIGHT AND POWER COMPANY.

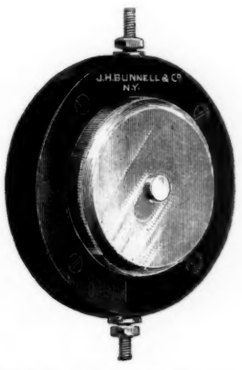
Boston, Mass., Jan. 27th.

.... It has been decided to reopen the Telegraph School in Bogota, United States of Colombia, which, owing to the late war, has been closed for over a year, and to add to it a special department for women. The Inspector General of Telegraphs, Mr. Ernest Danvers, has been appointed the Director-in Chief.

An Electric Log.

The electric log invented by Bernard Faymonville, San Francisco, was recently tested by one of the ferry-boats—the San Rafael.

The primitive log was simply a piece of wood arranged so as to present a broad resisting surface to the water. It was attached to a long line which had knots or bits of leather tied to it at regular intervals. When the log was thrown into the sea the resisting surface prevented it from moving appreciably forward through the water, and the speed of the vessel was determined by the number of knots that passed overboard as the ship sailed away from the log, in a period of time indicated by a half-minute sand glass, shaped like a small hour-glass. The speed thus indicated, however, was only approximate, and under certain conditions of weather not evenly approximately correct The instrument was called a log, probably because it lay like a log on the water after being thrown over. The process was called "heaving the log." Within the past half century great improvements have been made on the original device. What is called the metallic screw log supplanted the triangular log-slip years ago, and after a great number of modifications is still in use. The principle is that of a hollow cylinder, nine or ten inches long and an inch or a trifle over in diameter, with four fins or blades placed at a certain angle, so as to rotate as it passes through the water. The rotating section acting upon a system of cog-wheels within the cylinder, which is water-tight, registers the



TUBB'S THERMOSTAT—J. H. BUNNELL & CO.

speed on three dials, graduated respectively for miles, tens and hundreds, in the same way that the dials of a gas meter show the number of feet of gas that have passed through it. Different plans have been invented for registering the revolutions of the log on board the ship, but none of them have been satisfactory. It has been left for a California inventor to accomplish the desired end, says the *Call*, of San Francisco. Mr. Faymonville has brought electricity into service, and by means of his invention the master of a vessel may recline in his snug cabin and read off the miles his craft is making at any time, night or day. His log consists of the brass cylinder before described, with four blades or fins. The cylinder revolves on its swivels, practically frictionless, and in turning acts upon a small cog-wheel inside, which causes a short interior cylinder to turn, and every ten revolutions breaks the circuit. The battery is on board of the ship, and the register or indicator is placed in the captain's cabin, or anywhere convenient or desirable. There may be several registers distributed for convenience over the vessel. The wires for the onward and return currents are attached at one end to the register, and the other to the log which is dragging behind the ship. Ten revolutions breaks the circuit, and the mile hand on the dial of the indicator registers one-tenth of a mile passed over, and one passage of this hand around the dial denotes a mile of distance, and another hand moves forward one-tenth of ten miles. It passes around the dial once in ten miles, and the third and shortest hand passes around in 100 miles. When the San Rafael had backed out of her slip and headed for Sausalito, the log was thrown overboard. The experiment was conducted by Mr. Faymonville, with the assistance of Bruno Heinrich, an electrician, and was witnessed by Capt. Wilson, of a merchantman, and several other gentlemen. They watched the little dial with great interest, and its performance was very gratifying, demonstrating to the satisfaction of the gentlemen present that Mr. Faymonville has got the right principle. Although the little instrument had not been tried with a practical test before, and although they had forgotten to oil the bearings, it worked almost unerringly, seldom failing in its office. Whatever defects appeared were mechanical. The rate of registering can be regulated to any number of revolutions. The correctness of the work of this instrument was shown in the fact that, taking the speed of the boat as indicated, and the time occupied in making the trip, it gave the correct distance between San Francisco and Sausalito—a trifle over six miles.

Electricity in Indiana.

Editors Electrical Review:

It may be interesting to you to know what is going on electrically here. There isn't much in the way of news for everything new is old.

The city is lighted by electricity furnished by the Evansville Gas and Electric Light Company, who are using the Brush system. The lights are mainly supported on arches spanning the street diagonally at the intersection of every two or three blocks, with here and there a tower. The city pays $25,000 per year for the light.

Before the advent of the electric light the gas company had a monopoly and everything their own way. The opposition organized the electric light and obtained a three years' contract and on top of that a ten-year contract. This caused the gas people to hedge, resulting in the consolidation. Now the two are one. This reminds me of the old proverb:

> "There was a man in our town:
> And he was wonderous wise:"

oou know the rest.

The telephone system here seems to be a very good one. It is owned by intelligent men not bound to the A. B. T., never having gone under their protection. The law recently passed in Indiana limiting telephone charges to $3.00 is a dead letter almost exclusively. Intelligent citizens readily recognize the fact that telephone service canno be rendered for that amount. The old system of rates is in force by common consent.

ANON.

Evansville, Ind. Jan. 30, 1886.

Puzzled Over His Induction Coil.

Editors Electrical Review:

I am puzzled to see that, with so small an induction coil used in a Blake transmitter, I can telephone at forty miles as easily as at five miles of distance. I suppose, however, that there must be a limit of power for such a coil. Friends say I am wrong, but I persist to believe that for a long distance—let us say 500 miles—we are obliged to use a more powerful coil, etc. And, moreover, I humbly suppose that if we could find any transmitter allowing the use at will of any number of cells of battery, we could, with proportionate coils, overcome the resistance of any line, and then telephone at any distance. I understand well that the sound would not be increased, but only transmitted farther by such an increase of strength of the electric current. Please tell if I am right or not.

A STUDENT.

MONTREAL, January 23d, 1886.

* * The Treasury Department has sustained the action of the Collector at New York in assessing duty at the rate of 45 per cent. *ad valorem* on certain so-called electrical instruments returned by the appraiser as manufactures of metal and glass, and which were claimed by the importers to be dutiable at the rate of 35 per cent. *ad valorem* as philosophical instruments.

Electrical Review.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. J. Viennot, 150 South Fourth Street, Philadelphia, is our accredited representative for Pennsylvania.

Frank M. Gilley. 54 Equitable Building, Boston, Mass., is our New England representative.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill, will represent the REVIEW in the West.

Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, FEBRUARY 6, 1886.

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THE ELECTRICAL REVIEW will have headquarters at the Baltimore Electric Light Convention, where all will be cordially welcomed. The REVIEW staff, Mr. C. J. H. Woodbury and other of our contributors will be present during the week.

The report of Lieut. Millis, U. S. A., relating to electric illumination of lighthouses will be found to be of much interest, and we give it considerable space in this issue. Lieut. Millis is a capable and enthusiastic worker in this field, and the results of his experiments are, in the main, favorable to electricity as an illuminant. In his own words, the only "unsolved part of the problem of the electric illumination of lighthouses, or more properly, the part less perfectly solved than any other, is that which relates to the lamp itself, and it is therefore to this that experiments and study have been principally directed."

The chairman of the transportation committee authorizes us to announce that from all points on the trans-Ohio divisions of the Baltimore and Ohio Railway this company will carry delegates to and from the National Electric Light Convention at Baltimore for one full unlimited fare for the round trip. This includes Chicago, Toledo, Pittsburgh, Cincinnati, Columbus and Cleveland.

We are pleased to notice that Mr Thomas Pray, Jr., has accepted the position of General Superintendent of the Mather Electric Company, transferring his labors from the literary part of the mechanical field—where he was well and favorably known—to the active field of electric lighting. Mr. Pray will undoubtedly become a leading factor in the progress of electric lighting, where gentlemen of his ability and capacity are always welcome.

Public experiments with telegraphy by induction were made this week on the Staten Island Railway. This system was invented and adapted for practical use by T. A. Edison, E. T. Gilliland and W. W. Smith. Its object is to obtain perfect and instantaneous communication, in both directions, between fixed telegraphic stations and moving trains. The experiments were witnessed by a large party Monday afternoon, Messrs. Edison and Gilliland being present. As soon as the train was under full motion after leaving Clifton, telegrams sent at Clifton began to pour in on the train. The party were fairly bombarded with telegrams of every conceivable nature. Business, love, personalities, politics and religion ran riot, the messages being received as written. The apparatus consists of an ordinary Morse key, a phonetic receiver (which was attached to the ear of the operator), an ordinary electro-magnet and a battery. At the fixed stations a similar apparatus is used. The waves of electricity pass through the air from the roof of the car to the ordinary wire running along the railroad, the exchanging of messages not interfering with the transmission of regular messages on the wires. The apparatus is grounded through the rails. Mr. Smith, the original inventor of this induction telegraphy, is a well-known telegraph and telephone man, General Manager of the Missouri and Kansas and United Telephone Companies of Kansas City, Mo. Through Mr Edison and Mr. Gilliland the system has been perfected as above shown.

THE ELECTRIC ILLUMINATION OF LIGHTHOUSES.

The following abstract of the report of Lieut. John Millis, U. S. A., published in the Report of the Lighthouse Board for 1885, which has just been received, will doubtless prove of interest to the general reader as well as to those engaged upon the study of the subject of coast lighting by electricity.

The Lieutenant's report commences with a description of the plant at Hell Gate and review of the work done up to date. "This light, which is situated on Hallet's Point, in the village of Astoria, Long Island, and is designed principally to assist in the passage of Hell Gate at night, was first exhibited October 20, 1884." "The tower is a four-sided skeleton iron structure 250 feet in height and 55 feet square at the base." Owing to the limited size of the Government lot, it was found necessary to place the buildings and cisterns within the base of the tower. The boilers, which are in duplicate, are "plain cylindrical," with return flues. There being no available fresh-water supply in the vicinity, the two cisterns were constructed to receive the rain water from the roofs of the buildings, but owing to the limited roof area it has been found necessary to resort to salt water taken from the river a large portion of the time.

He states, that owing to this fact and the high steam pressure carried at first (80 pounds) there was great difficulty from the deposit of scale. "As the steam apparatus was first arranged, there were two steam pumps for feeding the boilers, and the feed water passed through the heater. The pumps were too large to feed continuously, and when not feeding were used to circulate salt water through the heater to condense the exhaust steam from the engine.

"The frequent changes from salt to fresh water and back again wasted considerable fresh water from the cisterns and introduced salt water into the boilers. At the suggestion of the principal keeper a smaller pump has been added, which feeds continuously direct from the cisterns to the boilers, and the large pumps are used only for circulating salt water through the heater, which thus acts as a surface condenser. The condensed water from the exhaust runs direct to the cisterns and the feed water is kept hot. By this change, and by reducing the steam pressure to 70 pounds the difficulty from scaling has been much lessened, and there is also a marked increase in the percentage of fresh water saved."

"Nine Brush lamps are placed at the top of the tower, and access to them is obtained by means of a counterpoise elevator. The maximum candle-power of each of these lamps by actual measurement is 3,114 standard candles. Two dynamo-electric machines of the Brush pattern form the means of generating the current used, giving about 343 volts at the terminals and 33 amperes. The light has been several times extinguished owing to the inexperience of the keepers and several such accidents as are to be expected in a new plant, but there have been no interruptions since March 24th, and Lieutenant Millis states that with the greater experience of the keepers, and the electric apparatus being duplicated, there is now little danger of another extinction except from failure of the engine or further trouble with the ice." On one occasion ice formed on the elevator ropes and prevented access to the lamps.

Mr. Millis continues: "By means of reflecting surfaces and refracting media the rays of light radiating from any source of relatively small size can be so directed as to cause them to take any desired direction. All such devices are expensive, however, and cumbersome, and cause a loss of light in proportion to the extent to which the direction of the rays is changed.

"Therefore to reduce the size and cost of the optical apparatus necessary to a minimum, and to secure the maximum efficiency, the luminous source itself should be so designed and placed that the greatest possible amount of light shall be radiated within the smallest possible angular space about that direction from which the light is designed to be farthest visible, and this implies a light of the greatest possible maximum intensity and penetrating power. As in practice the light source is always of an appreciable size with respect to its distance from the nearest surfaces of the optical apparatus, there is necessarily a certain amount of deviation of the rays from the direction desired; and this deviation is in general proportional to the angle subtented at the surfaces of the optical apparatus by the light source. The greatest efficiency of the light and economy in the apparatus therefore requires a light source of small dimensions. There are also required the qualities of constancy of luminous intensity, permanence of form, and fixedness in position, or, when necessary, the variations in these respects should be under perfect control. Finally there must be a reasonable economy in maintenance." It now remains to consider the electric light as to its fulfillment of these conditions, and its consequent adaptability to lighthouse use. The electric current furnishes the means of producing in the electric arc lamp the most intense and concentrated light source known, and while one of the first practical uses that it was attempted to make of this lamp was for a lighthouse illuminant, the development of this application of the electric light has been far behind most others. The arc light possesses the qualifications of intensity to an unsurpassed degree, and while experience has shown that its penetrating power is less proportionally than that of a light in which the longer wave-lengths predominate, the electric arc is believed to furnish the means of creating a light which for all states of weather will be visible farther than any that can be otherwise produced. The light-giving surfaces in the electric arc are extremely small compared with the intensity, but as the quality of fixedness is to a great extent wanting the smallness of the luminous surfaces becomes a serious defect rather than an advantage. Much larger optical apparatus is required than would be necessary were the light fixed in position, in order to diminish the effect of small movements which constantly occur, and frequent adjustment of the light is required. With regard to the light, a notable difference exists between that class of arc lamps operated by continuous current and that requiring an alternating current.

The Lieutenant states, that in lamps of the former class the most advantageous position is with the carbons vertical, but even in this position the direction of the maximum illumination is 45 degrees from the horizontal. For this reason, and on account of the greater difficulty of keeping the light adjusted to the focus of the lens, continuous current arc lamps in any of the forms heretofore devised, are not suited for lighthouse purposes, and their use may be said to be practically abandoned. The De Meritens alternating current lamp, with a lens specially adapted to it, and the De Meritens alternating current magneto-electric machine constitute what may be called the most practicable, and, in fact the only arc electric lighting apparatus at present in use for lighthouses.

As certain qualities possessed by the incandescent electric lamp promised to render it of use as a lighthouse illuminant, considerable experimental work in this direction has been done.

Incandescent lamps of much higher candle-power have been made, and a lamp for use in a first order lens has been completed, the preliminary tests showing that it can be operated continuously and with safety at about 450 candle-power. Experiments have shown that the readiness with which this form of lamp can be extinguished and relighted, promises to render it applicable for intermittent lights with the great advantage of simplifying the optical apparatus and doing away with the revolving machinery. It is a matter of regret, the Lieutenant continues, that it has not been practicable to thoroughly study the relative penetrating power of lights of different qualities by actual observation from a distance, since this constitutes one of the most important features of the whole subject. Such observations as it has been practicable to make indicate, however, that the incandescent light is not inferior in penetrating power to flames, and is without doubt relatively superior to the electric arc, and is, therefore, better adapted than the arc lamps for red lights since the proposition of light of short wave lengths is not so great. The simplicity of the lamp and fixtures required, the ease with which it can be accurately adjusted in position and kept so, the fact that the lamp itself requires no attention while in operation, and the readiness with which it can be applied to any first order lens now in use, with no disturbance of the present illuminating apparatus except the temporary removal of the burner, are some of the further advantages possessed by this lamp which seem to warrant continued and more thorough investigation. The electric lamp curve shows that a large percentage of the light falls upon the refracting drum of the lens which is by far its most efficient part. The amount of radiation that takes place at a greater angle than 45 degrees from the focal plane is so small that beyond these limits the catadioptric rings of the lens might be omitted entirely. The electric lamp is greatly superior to the oil flame in another respect. The greater size of the flame produces more useless divergence of the light after it leaves the lens, and the form of the flame is variable. Its height is considerably affected by the state of the weather, and unfortunately the lamp always burns poorest in thick weather, when most needed. Besides the diminished luminous intensity which results the brightest part of the flame is lowered, and if the burner be so placed as to give the best effect when the lamp burns properly during bad weather, the light is not only less bright but is thrown too high above the horizon. Of electric generators there are now obtainable many varieties, which are well constructed, easy to operate, efficient and suited to any condition which may occur in practice. Steam motors especially designed for this work have also been carried to a high state of perfection, and the only unsolved part of the problem of the electric illumination of lighthouses, or more properly the part less perfectly solved than any other is that which relates to the lamp itself, and it is, therefore, to this that experiments and study have been principally directed.

GENERAL WESTERN NEWS.

The animus of the New York *Times'* criticisms on the underground problem somehow reminds one of the condition of affairs in a district school, or a country singing club, where every young fellow lays claim to the hand of the belle, and a new aspirant appears on the scene. The fresh arrival is at once singled out as a dangerous element in the little community, and all the heretofore inharmonious males suddenly become friends and plotters against the common enemy. When, finally, the objectionable young man is disposed of, the old stife is again apparent and the bitter rivalry is again renewed. So it looks in this underground matter. Every time an advocate of the Wuggins, or Muggins, or the Stuggins system gets a hearing he opens out with: "Gentlemen, I represent the ——— system which is acknowledged to be the best system on the face of the earth, and while I am on that point, gentlemen, permit me to say the Dorsett system, 'so called,' is no system at all. I have nothing to say of other systems. My system is just the thing you want, but the Dorsett," etc.

Now where there is so much cry of 'Wolf! Wolf!" there is certainly some reason for the conviction which is at the back of the assertions made.

There is just this about the Dorsett system, the material of which it is composed is capable of being made to fit anybody's building, anybody's area, anybody's grade, and all the while it is the same excellent insulator, whether in pipes, round, square or any other shape, with large or small ducts, with manholes in the streets or hand-holes under the curb or under the building. If there is any other species of material which is capable of as wide a range of applicability the inventor is doing a great wrong just at this time, when its appearance would settle so many sour stomachs, and cure so much yellow-eyed dypepsia among the newspaper electricians, in promoters and the advocates of a hundred or more "so-called" systems.

Away out here, in the rowdy west, the electric currents,—and it would seem that they, after all, are the parties to be consulted and accommodated—are doing quite well, and whether these currents are telephonic, telegraphic, or electric-light, they run right along about their business, just the same as if the New York *Times* was not published—precisely the same as if the advocates of the Wuggins, and Stuggins, and Muggins, systems had never assumed that the Dorsett conduits were failures.

One statement of the New York reporter: "It is claimed that at a temperature of 150° they will collapse," etc. Yes, if you remove these from all contact which will serve to dissipate the heat, a temperature of 213° Fahrenheit may soften the asphaltum; but even at that temperature it will not become plastic. But put the pipe in the ground, put it where it is to be used, and a constant exhaust of steam from a boiler carrying 90 lbs. pressure does not phase it; while a heat that has to be guarded against in any system by lagging, is treated in a precisely similar manner.

It is like the fireproof wire question. An inflammable wrapping on a No. 4 or 6 wire will not light with a match. The wire carries off the heat. Strip it, or pull the wire out, and the cunningly devised trick of the wire salesman is defeated. The insulation burns quite readily.

There are wheels within wheels, even in the telephone war. The Michigan Overland Company, which was announced as having at last assumed the part of aggressor, after being downed by the Bell people for so long a time, has its own

"Rather tough worm in its little inside,"

according to a Detroit correspondent.

The company held a meeting on the 22d inst. to decide upon whether to advance on the enemy's works, and the fact broke bulk that the New York attorney of the company had entered into a stipulation with the Bell Company, providing for a permanent injunction against the warlike Overland in Michigan. The directors were indignant at this action of their legal mainstay, and so intimated by a telegraphic flash. His answer suggested a stay of judgment until he could explain. It is said that an attempt will be made to have the injunction set aside; and if that fails the company will probably be reorganized under some other name, while still claiming to be the original Doctor Jacob with the genuine trade mark adorning the steel plate wrapper.

The prejudice against electric light currents is hard enough to contend against when the under dog has a fair show. But when, as in a recent case in Jersey City, on the occasion of an alarm of fire, the hose boys deliberately backed up to a hydrant, and got all ready to play on the exhaust steam from an electric light engine, assuming this to be flame and smoke, we electrical fellows don't think we are well used. The timely arrival of the chief engineer saved the plant a precious ducking, and the five laddies went elsewhere with their engine and their enthusiasm.

General Superintendent Zeublin, of the Baltimore and Ohio Telegraph Company, says that he has made three different attempts to get into Minneapolis, by the Rapid Transit, by buying the Bankers and Merchants', and through the North American lines. Failing in these various directions, the company has decided to construct its own line, and he claims that by next June he will have reached Minneapolis, St. Paul and Duluth, and that Fargo, D. T., will be opened by the first of November. All this means reduced rates and promises of better service than is at present rendered by companies in the field. Work is to commence at once, all material being in the hands of the company save poles, and these are being arranged for. The particular route is not designated, but rumor has it that the wires will run along the Wisconsin Central from Milwaukee, west to Abbottsford, with branches to Duluth via Ashland, and to Minneapolis via Chippewa Falls. Application has been made to the councils of Minneapolis and St. Paul for street franchises, and also at Duluth.

The regulator is getting in his work in Iowa. On the 26th inst. a member of the house introduced the epidemic telephone bill, with its $3 provision—or two for 5—with a tariff for toll service of what a telegrapher would call 15 and 5.

At an adjourned meeting of our city council on the 27th the committee on fire and water recommended the passage of an order requesting the city electrician to furnish estimates for the lighting of the Chicago river, from Rush street to Harrison, by electricity. The distance is something over a mile and three-quarters, and covers the most used portion of our inner harbor. It was so ordered.

Chicago has just witnessed the outcome of one of those unlawful combinations called labor unions. Unlawful, because, when carried to the extent of which they are capable, the result is as in this case, the loss of a human life. In the majority of cases the members of these organizations are led gradually on until they feel bound—and the rank and file are honest—to fall into line, and be instructed by the leaders, until they really feel that it is a bounden duty, conformably to their obligations, to outrage the moral sense of the community by unlawful hindrances, interruptions and abuse of fellow workers who, from conscientious scruples or other reasons which they consider satisfactory to themselves, have never joined the union.

It makes but little difference whether the parties to the difficulty are brick or box-makers, telegraphers or telephone employes, the employer has still the right to say whom he will employ—the employed has the right to leave the service—neither the one nor the other is right in attempting to compel a relinquishment of the right on the one hand of employing whom we will, and on the other hand of refusing to work. When the union assumes to dictate and enforce demands in excess of this right, its opposition by the employer is just and lawful, and if the case is pushed to such extremes as in this one of the box-makers' strike, where one human life was lost at the hands of the strikers, the sympathy of the looker on is at once transferred to the "rats" and "scabs," and all the moral effect, which might properly pertain to the strikers' cause if properly managed, is turned against them immediately they make a martyr of one of their opponents.

Mr. J. H. Hapgood, of the Thomson-Houston Company, has just finished the installation of a 100-light central plant in Detroit. The dynamos and engines are placed at the Detroit Stamp Works establishment. Two 30 light and one 45-light machines furnish the current. The wires are entirely underground except for a short distance beyond the underground, which is included in the proposed conduit extension of next year.

The Underground Service Company, of Detroit, uses the Dorsett system, and the length of the wire in these Dorsett ducts is not far from four miles—the two circuits measuring two miles each. The trial of the plant took place on the 28th, and the result was thoroughly satisfactory in every particular, and Mr. Hapgood says he is extremely well pleased with the outlook. He has already engaged to furnish lights to the full capacity of his generators, and pressing demand is made for more, so that greater facilities or refusal of business are the horns of the dilemma in which he is placed; and it is safe to assume that of the two the former horn will be accepted.

The Inter-State Telephone Company stock case, before referred to, came up on the 28th inst. Voluminous answers were filed by the defendants, T. B and J. C. Gault, R. M. Luton, and others, who deny all intent of fraud in selling and inducing purchase of the company's stock by complainants, Joseph Reynolds and Robert Bines.

Once on a time a minister met a poor, forlorn mourner at the door of a hotel, and the unfortunate person, who was impecunious and an orphan besides, sold to the honest minister a valuable heirloom watch worth a hundred dollars for thirty pieces, in order the better to bury his mother-in-law. And when the unfortunate kissed the departing watch farewell with a sort of a bee-stung-me-on-the-lip sigh, and took the money, the purchaser pocketed the watch with the proud satisfaction of having relieved the wants of a fellow being, and felt as does Mr. Punch, when, having knocked his wife on the head, he remarks in brassy tones "Ah, ha! that's the way to do it."

Now the next day, when the reverend gentleman was on his way to a missionary station, and far out on the briny deep, and he discovered that he had paid many times too much for his whistle, he inwardly regretted his act of charity, whereby he had been swindled by the impecunious orphan with the dead mother-in-law. And he consoled himself by writing a sermon on the wickedness of the world, and in deploring the impossibility of ever overtaking the wrongdoer, while the growing sea between them moaned like One of old between two thieves, for the moral obliquities of the human race But the successful dealer in heirlooms and deceased mothers-in-law enlarged his facilities for trade, and said that providence protected him.

"How different the landscape seems
From varying heights surveyed;
So, too, a difference it makes
Who's swindled in a trade."

S. G. Lynch, 144 La Salle street, reports telephone stock values as follows:

Chicago	$875	@	$400
Central Union	51	@	52
Michigan	65	@	67
Iowa Union	15	@	18
Great Southern	25	@	30
Colorado	18	@	20
Rocky Mountain Bell	40	@	45
Mo. & Kas.	52	@	54
United	15	@	17
Cumberland	70	@	75
Wisconsin	110	@	112

CHICAGO, Feb. 1, 1886.

BOSTON ELECTRICAL NEWS.

The city of Burlington, Vt., will be lighted at the opening of the carnival, Feb 15, with arc and multiple series incandescent lights, to be furnished by a local Brush-Swan Electric Light Co., recently formed through the efforts of the New England agent, Mr. Frank Ridlon. The strong demand in this city for light in the streets will now be met.

An isolated 15 arc-light plant was started Jan. 29th, at T. Martin and Bro, Chelsea, Mass., under the supervision of the chief engineer of the Brush Co., Mr. John O'Neil. The lights, which are 1 200 candle-power and fully equal to the half-arc lamps burning in many places in New England, are placed one to four looms. The lights were remarkably steady. This was in part due, as the motive power is a throttle-governor engine, to the new wall regulator.

The Plymouth Electric Light Co. (Mass), which started three months ago with 25 arc lights, and in a few weeks added 30 more lights, expect soon to increase their plant to 80 lights. The company use the Ball system, and find that the light for which they charge when burning from dark to midnight 30 cents per night, is very popular and will probably, before the summer season, be used in street lighting.

The Consolidated Electric Light Co. have closed a contract with Waite, Son & Co. Sandy Hill, N. Y., for a 150 incandescent plant.

The 8 C. P. incandescent light in the elevator of 95 Milk street has now been in use 227 hours since the first of January. Eleven cells have been used, and the depolarizing fluid has not been touched.

The recent sleet storm disabled about 300 telephone wires in Boston by breaks and crosses, which were rapidly repaired. The extensive use of cables prevented any serious damage. At Portland, Me., the wires are all down, and about one week will be required to repair the damage. At Newburyport, Mass., the lines will be in working order Tuesday, although the fixtures are blown down and the wires are between the branches of fallen trees. At Portsmouth, N. H., the wires are nearly all down. At Worcester, 75 wires, and at Lowell, 50 wires were disabled, but will be repaired by Sunday night.

On the Northern and Fitchburg Division of the New England Telephone Co. the white birch trees have blown on to the roads so as to meet and render the roads impassable. Two weeks will be needed to repair the lines.

The telegraph lines have fared no better. Between Boston and Bangor a gang of fifty men have been at work, but have been compelled to use axes to clear away the fallen trees, and have, therefore, made little progress.

The central station of the Edison system, in Boston, is now assured. Mr. Edward H. Johnson, President of the Edison Company, signed the lease this week for the location of the station, and three Armington & Sims engines, to be set with the Jarvis furnace, have been purchased. About 4,000 lamps have been contracted for.

Boston, Mass., February 3d.

A large delegation from Boston will visit Baltimore on the 10th of February to attend the Electric Light Convention to be held in that city. The Brush Electric Light Company will be represented by Mr. Frank Ridlon and Mr. S. S Sias. The Thomson-Houston Company by Mr. W. B. Hosmer. The Daft Electric Power Company by H. McL. Harding and Gen. E. C. Pike. The Jarvis Engineering Company by Mr. A F. Upton, General Manager. Armington & Sims Engine Company, by Col. Gardiner C. Sims.

Telephonic News

⁂ These are interesting days to the telephone and telegraph people—the Legislatures are in session.

⁂ "Hello" doesn't begin to express the feelings of the Pan-Electric Telephone Company. Quite the reverse.

⁂ Mr. Chas. F. Cutler, of this city, has resigned the presidency of the New York and Pennsylvania Telephone Company.

⁂ The telephone is likely to go ahead in Italy. Special laws are being framed with a view to promote the industry, and concessions for fifteen years are to be given to eligible persons.

⁂ The Legislature of New Jersey has a bill before it ordering all the wires in the cities of the State underground, under penalty of $100 per pole left standing. Its passage is not probable.

⁂ The use of the telephone is fast extending in Austria. Communication has just been established between the town of Gleichenbergh, one of the principal industrial centers of Bohemia, and Gablonz, another manufacturing town twelve miles distant.

⁂ The Clay telephone people, of Philadelphia, are discussing the question of having lifted the order of the court restraining them from doing business. They have commenced to move in the matter since the decision of the Secretary of the Interior has been announced.

⁂ The annual meetings of the Missouri & Kansas and United Telephone Companies, were held at Kansas City, January 28th, and nine directors were elected as follows: J. R. Mulvane, J. S. Chick, J. A. Corby, W. B. Clarke, C. D. Crandall, James T. Lane, E. T. Gilliland, Geo. L. Phillips, and T. N. Vail. The directors met and re-elected J. R. Mulvane, President, and C. D. Crandall, Secretary and Treasurer. The annual statement to stockholders will be sent out in a few days.

⁂ The National Telephone Company, of England, states that during the late snowstorms, although they have different gauges of wire, such as iron, copper and bronze, on the same poles, there was not a single breakdown recorded, although one of the junction poles, 105 feet high, carries 190 wires, consisting of No. 17 copper, No. 11 covered iron and 18 G bronze. The trunk lines to Loughborough, Long Eaton and Ilkeston, and three suburban junction lines, also escaped interruption. The first-named trunk loop extends forty miles in length, being connected on the metallic system, and passing through a very wooded district. The following fires were signaled within the borough of Nottingham during the month of December, 1885, viz.: Two by telphone and twelve by street fire alarms.

⁂ A Washington special says: Prof. Elisha Gray's presence here for the last few days and talk with him have confirmed the impression that the great telephone suit will be brought here. The fact that the Bell company have bought up all the patents they could get hold of relating to telephones, will still keep them a rich and powerful corporation, even if they lose the suit. It will not hurt Prof. Bell very much, as both he and his father-in-law, Mr. Gardiner G. Hubbard, have got rid of most of their telephone stock at a high figure, and their money is salted down in less fluctuating securities. This last fact will be used against Prof. Bell in the furious fight which is to be made on him. Among the lawyers who have attacked the Bell patents, the fiercest is Senator George F. Edmunds, and among those who have defended them the strongest is Roscoe Conkling. Prof. Bell disputes with Mr. T. A. Edison the palm of having had more law suits brought against him than any man, living or dead.

⁂ H. B. Steele, of Worcester, Mass., has invented an instrument for an alphabetic and stenographic telegraph apparatus.

⁂ The New Haven *News* takes the following decided view of the present telephone scandal:

"The whole attack on the Bell patent has always seemed to us to be an enormous conspiracy to steal a very valuable property, and this view has certainly been borne out by all the numerous decisions which have been given in the United States courts. The worst thing about the whole matter is the position of the Attorney-General, whose financial prosperity is largely involved in the success of the attack. If suit is to be brought to annul the patent in the name of the United States, Mr. Garland will have to go. His retention at the head of the Department of Justice under such circumstances would be too grave a scandal to be endured by any Administration."

⁂ The New York *World*, a leading Democratic daily, takes the following view of Attorney-General Garland's position in the telephone controversy:

"Mr. Garland owns $1,500,000 of stock in a Telephone Company whose instrument is alleged to be an infringement of the Bell Patent. If the Bell Patent is declared fraudulent this stock alone will make the Attorney-General wealthy. If the Bell Patent is sustained the Attorney-General's stock be comes waste paper.

"No one doubts Attorney-General Garland's personal integrity. We respect his ability. But he is placed in a false position by his ownership of this stock. He should rid himself of it at once. He cannot regard it as desirable that the judges before whom the Bell case will be tried should know that by their decision they enrich a high Cabinet officer, or render his property worthless. We ask him whether he considers that his ownership of this stock is calculated to raise the highest standard of official honor in public life? We ask him whether it is creditable to a Democratic Reform Administration?

"The Democratic head of the Department of Justice should be not only above reproach but also above suspicion."

⁂ An official of the Patent Office has the following to say of the Bell telephone patents:

"I don't think that a decision adverse to the Bell patent would injure that company materially, or aid the other companies which have inventions. Especially would this be true if the broad principle was laid down that the process of transmitting articulate speech by an undulatory current of electricity was not patentable. Then any telephone could be used, and a man could run a wire from one point to another without interfering with patented rights. But when you come to join on to another wire, then you come again into the region of patented rights, and here the Bell company is supreme. For several years past it has bought up all the patents of any importance that have been issued for the various parts of a telephone. For instance, the Bell Company owns the Blake transmitter, which is the broad, underlying patent in telephony, the object of which is to vary the rises in electric currents by changing the conducting surfaces between two carbon contacts. Then they also own the Berliner induction patent, which is in use in every telephone box in the country, by which the low tension battery currents are transferred in high tension currents over outlying circuits. They control the patent for the switch appliances, by which, when you lift the receiver from the hook, the battery is thrown into circuit for use in transmitting, and at the same time the bell is cut off. The leading patents in telephone calls, switch boards, bells and general appliances for use in central stations are also owned by the Bell Company, so that you see the original patent is of little consequence, as the telephone is now used. The methods by which the principle is made practical are all patented, and the most valuable of these are controlled by the Bell Company."

Lively Time in the Pan-Electric Camp.

There was a very lively and sensational meeeting of the Board of Directors of the Pan-Electric Telephone Company last week in Washington. It was held at the rooms of Senator Isham G. Harris. All of the directors were present except Attorney-General Garland. His absence from the meeting of the Board was occasioned by slight indisposition. There were present at the meeting besides the Senator, Gen. Joseph E. Johnston, the Hon. J. D. C. Atkins, Indian Commissioner; J. H. Rogers, Col. R. F. Long, J W. Rogers, and Col. Casey Young. After transacting some business of minor importance a union with the National Improved Telephone Company was discussed. Col. Young, the Secretary of the Pan-Electric Company, stated that he had become convinced that there was an infringement by the Pan-Electric Telephone on the National Improvement. This latter company is a small company, founded on J. H. Rogers' earlier patents. Mr. Rogers, the inventor, was present when Mr. Young made this statement. He became very much excited. He at once exclaimed: "You convinced? Why, after I had explained the te'ephone to you for a week you acknowledged that you did not know a receiver from a transmitter." This made Col. Casey Young angry. He turned upon Rogers and made some very sharp remark, whereupon young Rogers called out: "You are a fool." At this, Col. Casey Young struck at Rogers, when the latter promptly knocked down the Secretary of the Pan-Electric Telephone Company. Great confusion ensued. The two gentlemen were separated. At the suggestion of Indian Commissioner Atkins a committee was appointed to settle the quarrel. Gen. Joseph Johnston and Senator Harris were appointed. They found that young Rogers was too hasty and in the wrong. They recommended that the two should shake hands and make up. This was done amid profound silence. Then Dr. J. W. Rogers, the father of the inventor, offered a resolution contradicting the statement in the New York *World*, wherein it was alleged that the patents of the Pan-Electric Telephone Company were infringements of the National Improvement Company. Senator Harris objected to the resolution upon the ground that if it were passed, it would be a tacit admission of everything else charged in the article. When this resolution was rejected the two Rogers withdrew in indignation. They were followed to the door by the officials connected with the Pan-Electric Telephone Company, who begged them not to mention a word of what occurred. Dr. Rogers replied: "This is a public meeting, and the instincts of gentlemen must guide us."

⁂ A dispatch from Lowell says: A meeting of the stockholders of the New England Telegraph and Telephone Company was held here this afternoon, when there was a free and lengthy discussion of the plan of concession offered by the American Bell Company. The latter own $4,918,900 of what is known as franchise stock in the New England Company and the concession proposed in view of the fact that the New England stockholders were discontented at realizing no profit from their investment was that the American Bell should waive the claim for seven years to dividends on $3,814,500 of franchise stock, which, however, should participate in all the earning above three and one-half per cent. and that construction should be provided for by issuing from the treasury stock to the amount of $1,000,000 preferred stock, bearing seven per cent. interest to be sold at par. The outcome of the meeting was an expression of dissatisfaction with the concession, and appointment of a committee consisting of George A. Marden, Joshua N. Marshall, and Frederic T. Greenhalge to confer with the American Bell to ascertain if the latter would not make a more favorable concession. Steps were taken toward the formation of an organization for the purpose of furthering the interests of the anti-Bell stockholders by influencing legislation and agitating and enlisting general sympathy in their course. The meeting of the New England Company o take final action on the proposed concession will be held in New York, February 2.

Bothered By A Telephone.

John Murray, a worker on wrought iron railings, who lives at No. 449 West Forty-sixth street, New York, is the victim of a curious hallucination. Several years ago he was the principal witness against a young burglar named Dunn, who is serving a term at Sing Sing, and he now fancies that Dunn, with the assistance of others, has concealed a telephone under the flooring of his room, in order to denounce him, and keep him awake. Murray called at the Yorkville Police Court to ask that a detective be sent to his house.

"Are you sure the telephone is under the floor?" he was asked.

"Of course," he replied. "I hear it buzzing and ringing in my ears all the time. If I get worried and denounce Dunn and his friends, they mock me by repeating whatever I say. I can't sleep for the persecution, and they are getting to use the telephone so well that sometimes I can hear them squares away from home. I really think my mind will go, if something is not done. My wife cannot hear the voices, and, of course, she will not believe there is any telephone. But yesterday I took up the flooring and almost caught sight of the machine. Dunn heard me at work and ran off with it laughing, before I got the flooring up—I heard him."

The man was told to come back with his wife and friends, and he promised to do so.

Queer Freaks of Telephones.

General Supt. Eckert, of the Metropolitan Telephone Company, tells a story of the effects of that peculiar disturbance which electrical currents exert upon one another.

"Before I came to New York," says Mr. Eckert, "I was in charge of the telephone system in Cincinnati. We were extending our lines out of the city, and had reached Hamilton, a distance of about twenty miles. It was Saturday, and the construction gang must be paid off. I had no time to go out myself, so I sent out a young clerk in whom I had great confidence, with the money, amounting to over $4,000. After he had gone I realized the risk I had taken, and began to worry about it. But it was too late, and the best I could do was to telegraph instructions to Hamilton, that the clerk should send me an account of the situation immediately on his arrival. There was dissatisfaction among the men there and the possibility of a strike, and the more I thought about the matter the more anxious I became. When I went out to my home, about five miles out of the city, I left instructions at the Western Union office that they should immediately telephone out any dispatch that came to me from Hamilton.

"Still I grew more and more uneasy. I worried so much over the matter that I couldn't eat my dinner, and left it to go to the telephone to ring up the Western Union and ask if any message had come in as yet. As I took the sounder off the hook and stood a moment with it at my ear, thinking what I should say, I heard 'W. H. Eckert, Cincinnati,' ticked off in Morse characters. You may imagine that I became somewhat interested. I listened and caught the whole message, 'Arrived safely. Paid off men. Settled all bills Have vouchers in my possession. Will return on 10.30 train,' and then came the signature of my clerk. I was at once delighted and astonished, because the telegraph wires came in at one side of the city and the telephone wires at the other, and there seemed to be no possible connection. I at once rang up the telegraph office, and told them of the message they were about to receive. They laughed at me, but in a few minutes it came in just as I had dictated it to them. The thing never happened again, and we were unable to solve the mystery, or to find a place where the wires came within many yards of each other."

—— Geo. H. Adams & Co., of Providence, have just completed the work of installing a 25-arc-light plant (Ball system) for Horace A. Kimball, Manton, R. I., and have also just completed the work on a 32-light plant of the same system, for the Riverside and Oswego Mills, of Providence.

The Wire Gauge of the National Telephone Association.

Secretary Barney, of the National Telephone Association, has issued the following wire gauge report:

New York City, January 16, 1886.

To the Members of the Association:

On the two following pages of this circular will be found tables of the standard wire gauge adopted by this association at its Providence meeting. The first table gives the dimensions, weights and resistances of both copper and iron wire. The dimensions are taken from the official table published by the Standards Department of the British Board of Trade. The weights and resistances are calculated by the usual rules.

The table is believed to extend to all the sizes of wire that will be practically used by members of the Association. In copper it runs from No. 0 to No. 40, and in iron from No. 4 to No. 16.

The second table gives the dimensions of wire according to the various styles of gauges now in common use as compared with the new standard gauge.

Yours very respectfully,

C. H. BARNEY, Secretary.

TABLE OF DIMENSIONS, WEIGHTS AND RESISTANCES OF COPPER AND IRON WIRE.

Compiled by C. H BARNEY, *Secretary of the National Telephone Exchange Association.*

Number of Standard Gauge.	Diameter. In Mils. (.001 in.)	Diameter. In Millemeters.	Pure Copper Wire. Weight, Sp. Gr., 8.90. Lbs. per 1,000 Feet.	Pure Copper Wire. Weight, Sp. Gr., 8.90. Lbs. per Mile	Pure Copper Wire. Resistance, at 59.9° Fah. Ohms per 1,000 Feet.	Pure Copper Wire. Resistance, at 59.9° Fah. Ohms per Mile.	Galvanized Iron Wire. Weight, Sp. Gr., 7.74. Lbs. per Mile.	Galvanized Iron Wire. Resistance, at 59.9° Fah. Ohms per Mile.	Number of Standard Gauge.
7-0	500	12.700	756.28	.....	.....	.....	.....	.....	7-0
6-0	464	11.785	651.31	.....	.....	.....	.....	.....	6-0
5-0	432	10.978	564.44	.....	.....	.....	.....	.....	5-0
4-0	400	10.160	484.03	.....	.....	.....	.....	.....	4-0
3-0	372	9.449	418.63	.....	.....	.....	.....	.....	3-0
2-0	348	8.839	366.36	.....	.....	.....	.....	.....	2-0
0	324	8.229	317.54	1676.61	.095774	.50538	.....	.....	0
1	300	7.620	272.37	1437.582	.11171	.58962	.....	.....	1
2	276	7.010	230.44	1216.72	.13199	.69690	.....	.....	2
3	252	6.401	192 11	1014.34	.15832	.83592	.....	.....	3
4	232	5.893	162.83	859.74	.18680	.98630	747.68	6.6884	4
5	212	5.385	135.96	717.87	.22370	1.18118	624.30	8.0100	5
6	192	4.877	111.52	588.82	.27273	1.4400	572.07	9.7656	6
7	176	4.470	93.71	494.78	.2458	1.7197	430.29	11.6222	7
8	160	4.064	77.445	408.89	.33173	2.0736	355.60	14.0625	8
9	144	3.658	62.730	331.21	.48486	2.5600	279.34	17.3611	9
10	128	3.251	49.565	261.70	.61365	3.2400	227.59	21.9726	10
11	116	2.946	40.707	214.93	.74718	3.9451	186.92	26.7539	11
12	104	2.642	32.720	172.76	.92955	4.9080	150.24	33.2-40	12
13	92	2.337	25.605	135.19	1.1878	6.2715	117.57	42.5331	13
14	80	2.032	19.361	102.22	1.5709	8.2943	88.90	56.2500	14
15	72	1.829	15.689	82.80	1.9394	10 2400	72.01	69.4444	15
16	64	1.626	12.391	65.42	2.4546	12.9602	56.89	87.8906	16
17	56	1 422	9.4869	.....	3.2060	.....	.....	.....	17
18	48	1.219	6.9700	.....	4.3637	.....	.....	.....	18
19	40	1.016	4.8403	.....	6.2837	.....	.....	.....	19
20	36	0.914	3.9206	.....	7.7574	.....	.....	.....	20
21	32	.813	3.0078	.....	9.8184	.....	.....	.....	21
22	28	.711	2.3708	.....	12.824	.....	.....	.....	22
23	24	.610	1.7425	.....	17.455	.....	.....	.....	23
24	22	.559	1.4642	.....	20.778	.....	.....	.....	24
25	20	.508	1.2100	.....	25.135	.....	.....	.....	25
26	18	.457	0.9s015	.....	31.041	.....	.....	.....	26
27	16.4	.4166	.81365	.....	37.381	.....	.....	.....	27
28	14.8	.3759	.66263	.....	45.90	.....	.....	.....	28
29	13.6	.3454	.55953	.....	54.338	.....	.....	.....	29
30	12.4	.3150	.46515	.....	65.388	.....	.....	.....	30
31	11.6	.2946	.40707	.....	74.718	.....	.....	.....	31
32	10.8	.2743	.35286	.....	86 197	.....	.....	.....	32
33	10.0	.2540	.30252	.....	100.541	.....	.....	.....	33
34	9.2	.2337	.25605	.....	118.79	.....	.....	.....	34
35	8.4	.2134	.21346	.....	142.49	.....	.....	.....	35
36	7.6	.1930	.17473	.....	174.07	.....	.....	.....	36
37	6.8	.1727	.13988	.....	216.94	.....	.....	.....	37
38	6.0	.1524	.10891	.....	279.28	.....	.....	.....	38
39	5.2	.1321	.08180	.....	371.82	.....	.....	.....	39
40	4 8	.1220	.06970	.....	436.37	.....	.....	.....	40

The resistances in the above table are calculated from Dr. Matthiessen's standard (1 mile of pure copper wire of 1-16 inch diameter equals 13 59 ohms at 59.9° Fahr).

The resistance of pure copper wire increases, as the temperature rises, about 0.21 per cent. for each additional degree F.

The resistance of iron wire increases, as the temperature rises, about 0.35 per cent. for each additional degree F.

TABLE SHOWING THE DIFFERENCE BETWEEN WIRE GAUGES IN DECIMALS OF INCHES.

No.	Standard. (New British)	B. W. G.	Brown & Sharpe's.	Washburn & Moen's.
4-0	.400	.454	.460	.393
3-0	.372	.425	.40964	.362
2-0	.348	.380	.36480	.331
0	.324	.340	.32495	.307
1	.300	.300	.28930	.283
2	.276	.284	.25763	.263
3	.252	.259	.22942	.244
4	.232	.238	.20431	.225
5	.212	.220	.18194	.207
6	.192	.203	.16202	.192
7	.176	.180	.14428	.177
8	.160	.165	.12849	.162
9	.144	.148	.11443	.148
10	.128	.134	.10189	.135
11	.116	.120	.09074	.120
12	.104	.109	.08081	.105
13	.092	.095	.07196	.092
14	.080	.083	.06408	.080
15	.072	.072	.05706	.072
16	.064	.065	.05082	.063
17	.056	.058	.04525	.....
18	.048	.049	.04030	.....
19	.040	.042	.05589	.....
20	.036	.035	.08196	.....
21	.032	.032	.02848	.....
22	.028	.028	.025347	.....
23	.024	.025	.022571	.....
24	.022	.022	.0201	.....
25	.020	.020	.0179	.....
26	.018	.018	.01594	.....
27	.0164	016	.014195	.....
28	.0148	.014	.012641	.....
29	.0136	.013	.011257	.....
30	.0124	.012	.010025	.....
31	.0116	.010	.008928	.....
32	.0108	.009	.00795	.....
33	.0100	.008	.00708	.....
34	.0092	.007	.0063	.....
35	.0084	.005	.00561	.....
36	.0076	.004	.005	.....
37	.0068	.....	.00445	.....
38	.0060	.....	.003965	.....
39	.0052	.....	.003531	.....
40	.0048	.....	.003144	.....

The proprietors of the Duval Hotel at Jacksonville, Fla., are putting an electric light in their office, and one in their dining room.

The Postal Telegraph Cable Company, the capital of which is $5,000, with right to increase, and the object of which is to establish telegraphic communication with various cities in the United States and Canada, has filed articles of incorporation in this State. The incorporators are James Withington, A. P. W. Seamen, George H. Steel, George E. Kent and John O. Stevens.

But little improvement is yet to be reported in the condition of the telegraph service. The storm about San Francisco must have been terrific, as the vast network of wires between that city and San José have all been broken down. Indeed, the principal trouble lies in that neighborhood, but it is bad enough all the way up. The single wire to Tulare is for the most part employed by the railroad company, and but one message up to the hour of going to press to-day had been received from San Francisco, at the Los Angeles office. A wire is working East, but it is not working well.—*Los Angeles Express.*

An officer in a Russian regiment of sappers, Lieutenant Kondinoff, has invented an instrument for the certain and easy interception of telegraph messages in time of war. The wire from which it is desired to steal a dispatch is cut, and promptly joined to a small box containing a new machine. It then immediately transmits the message to a roll of paper, which can be read upon the spot or sent to headquarters. The box, which weighs only about seven pounds, also contains an instrument for sending false answers to the enemy.

The city and county of New York holds two judgments against the Western Union Telegraph Company for unpaid taxes. One of the judgments is for $128,000, and the other for about $8,000. These judgments were affirmed by the Court of Appeals last year, and as the company neglected to pay them, Sheriff Davidson attached such property as he could find belonging to the delinquent corporation, and advertised it for sale. The date of the sale was fixed at Feb. 10. The Western Union's lawyers have as yet interposed no legal objections to the Sheriff's proceedings; but they have until Feb. 9 to do so. The belief generally prevails on the part of the representatives of the county that Mr. Gould's corporation will continue to fight for delay in the hope of getting a bill of relief through the present legislature.

Mr. A. C. Terry, Repeater Chief of the Western Union Telegraph Company, entertained the Buffalo Electrical Society recently with a description, profusely illustrated with drawings, of the various single-circuit repeaters in use in this country. The first repeater, he said, was that known as "Wood's button repeater." This was simply a combination of electro-magnets and batteries at some intermediate point in a telegraph line, for the purpose of relaying the currents from one section of the line to the other. This was done by causing the armature levers to strike against a metallic stop whenever they become actuated by their respective electro-magnets. The levers themselves were each connected with their individual line wires, while each metallic stop had a battery attached to it, so that whenever an armature was pressed against its stop under the influence of the current from the sounding office, the current from the intermediate battery flowed out to the receiving office. Such an arrangement was first tried at Auburn, in 18 6, for repeating or translating press reports to Ithaca. Two years later Bulkley devised an "open-circuit" repeater, upon which were made the first attempts at telegraphing between New York and New Orleans. These repeaters had the objectionable feature of requiring the services of an attendant at the repeating office for the purpose of "breaking" the sending station whenever desirable. Farmer and Woodman introduced a device in 1856 for automatically performing this function. Several other repeaters were subsequently invented with the same object, but none were perfectly satisfactory in practice. It was not until 1864 that Millikin, of Boston, brought out an apparatus in which the defects of previous instruments were entirely obviated. The exact manner in which this was accomplished was made intelligible to the audience by means of a specially prepared diagram, as was also the action of the "Toye" repeater, which, on account of its simplicity of adjustment and reliability of working, was well liked and extensively used. Mr. Frank Kitton, chief operator of the Western Union in Buffalo had, however, the lecturer remarked, effected considerable economy in battery power in the operation of the Toye repeater by the simple and ingenious device of making a local battery of a few cells perform the work of keeping the relay closed during certain intervals, which had heretofore been accomplished by means of the main line battery of some hundred or more cells. This modification of Mr. Kitton's had been in practical operation in Buffalo for more than a year, and had never been known to fail.

TELEGRAPHIC

Woonsocket is negotiating for a fire-alarm system.

James Goodsell, former president of the National Associated press, has been awarded $16,000 for a contract with him that was broken by the Western Union Telegraph Co.

The police telegraph system in Hartford will soon be working. Thirteen of the sentry-boxes are erected, and the remaining two will be placed in position as soon as the weather permits. The signal-boxes and battery have not arrived yet, and, after the other sentry-boxes are erected, all that remains to be done is the placing of the battery, the call-boxes and the signals in the captain's office at the police station.

A very interesting statement is made relative to the occurrence of exceptionally strong earth currents on the cables of the Eastern Telegraph Company on Saturday, the 9th inst. From Singapore very strong currents are reported on the China coast, Philippines, and Cochin China cables from about 3 to 5 P. M., and on the Java and Australia cables from 4 P. M. until late in the night, Singapore time. At Corfu the earth currents were noticeable all day on the Trieste cable, but were most powerful between 7 and 11 P. M., and at Gibraltar very strong currents were observed on the Malta, Lisbon, and Villa Reale cable. On the following day the phenomenon was also apparent, but was not so marked as on Saturday.

The Hon. Randolph Want, solicitor-general in London for the New South Wales government and commissioner for that colony to the new colonial exhibition, which opens in that city in May, is now in San Francisco and will remain until his colleague, Sir Alexander Stuart, arrives from Sidney, about February 21. These gentlemen are interested in a proposed cable line direct from San Francisco to Sidney, New Zealand, via Honolulu and the Fiji Islands. Mr. Want represents an English syndicate, the members of which are said to be prepared to furnish the cost of laying the cable, estimated at $10,000,000, as soon as they are assured of receiving a reasonable subsidy from all the governments interested. So far they have received assurances of liberal support from Hawaii and all the provincial governments of Australia and New Zealand, except Queensland, with the executive of which negotiations are still pending. The proprietors will ask a United States subsidy on the ground of increased commercial advantages between this country and Australia. Mr. Want says the toll will be a fraction over 50 cents a word, while the present charge is $2.50.

Some doubt has been expressed as to the right of the general Government to take possession of the property of the railroad and telegraph companies. The Constitution may be so amended by the requisite majority in Congress and of the States as to sanction anything. But as the present instrument stands, Congress has both the power to regulate commerce between the States and to establish post roads. Out of these two delegated rights it could find means to so depreciate the value of the corporations refusing to sell at a reasonable price, as to induce them to change their minds. It could build parallel lines in all cases, and this policy is contemplated in some of the bills for the establishment of a postal telegraph. There is little danger, however, of the people in the United States entering upon any scheme which amounts to confiscation. They will pay certainly whatever is just for what is appropriated in the interest of public policy, though they may decline to recognize any great amount of watered stock. But we are very far from being ready to undertake anything of the kind at present. True Civil-Service reform must come first.—*New York World.*

ELECTRICAL AND SCIENTIFIC

* * Henry Irving, as Mephistopheles in "Faust," carries an electrically lighted sword, and now Sir. F. Bolton proposes to have Mephistopheles carry three different colored lights in the peak of his cap, which will make Irving's performance fairly luminous, as well as electrical.

* * A valued correspondent, who is himself connected with one of the leading concerns in New Haven, Conn., writes me that a new partner in one of the large manufacturing concerns there, recently startled the office by sending out for the engineer, who came in and was asked:

"What did you stop the engine for?"

"Because my bearings were hot."

"Well, don't you ever do it again without asking permission from the office."—*Ironmonger.*

* * Articles of incorporation of the Troy, N. Y. Cable Motor and Construction Company have been filed. The object of the company is to supply steam for motive power to propel railroad cars by the method invented by A. H. Lighthall. The company also propose to furnish power for manufacturing purposes. The capital stock is $250,000, divided in 5,000 shares of $50 each. The incorporators are Gilbert Robertson, Jr., D. Peck, Charles Angus, A. H. Lighthall and Samuel Foster.

* * Mr. Bell's last scientific hobby is his discovery of the threatened formation of "a deaf-mute variety of the human race." He is about to memorialize Congress on the subject. He thinks that the continued intermarriage of the deaf and the deaf-dumb will eventually produce such a variety, and enforces his position by statistics. In agitating this matter he has stirred up a hornet's nest about his ears, as the deaf-dumb, who marry almost altogether among themselves, and who care nothing for science where their feelings are concerned, have strong prejudices on this subject, and declare they will not be meddled with.

* * A writer quotes a case of hydrophobic cure which is reported in the *Dublin Medical Press* of the 12th of November, 1862. The report in question tells how, after all the ordinary methods for giving relief to a hydrophobic madman had failed, electricity was tried as a last resource. The patient, who was raving and making attempts to bite all around, was firmly fastened to a mattress, and the poles of a strong battery were brought into connection with his feet and his throat respectively. The result was instantaneous cessation of the spasm, and, while under the influence of electricity, the patient willingly drank fluids. After a dozen applications or so of half an hour each, the poor wretch collapsed, but in place of dying he only perspired and vomited freely. After this a single spasm occurred a week later, whereupon another dose of electricity was administered, the ultimate result being a perfect recovery.

* * Professor Kupferschlaeger, in the *Bulletin de la Societe Chimique de Paris*: "All chemists know that commercial sulphuric acid, prepared from iron pyrites, contains lead and calcium sulphates, nitrous and sulphurous vapors, arsenic acid, sometimes selenious acid, thallium sulphate, and hydrogen fluoride. For its purification, the author dilutes it with its own weight of water, then passes through it in excess a current of washed sulphurous acid, so as to bring the arsenic and nitric acid, to a lower stage of oxydation, and to reduce selenious acid, if present. A current of hydrogen sulphide is then passed through it twice, with an interval each time as long as it is absorbed. The vessel is then closed, and allowed to stand for some time at a moderate temperature, so that the lead and arsenic sulphides, selenium, etc., may subside. The sulphuric acid is then rectified in glass retorts, applying the heat so as to reach the upper portion only.

Luminous Electric Goods.

Messrs. Frenyear & Razee, of Boston, are making a specialty of this class of goods, three designs of which are illustrated in this issue. In Fig. 1 is shown the push button, which consists of a round disc of glass, through which a desk-push passes fitting closely into a metallic plate, and a disc of luminous cardboard—made of oyster shells ground fine—is inserted between the glass and metal plates. In the daytime this presents a very neat appearance, and at night the entire surface, with the exception of the button, shines brightly. A luminous key, for automatic burners, and a luminous pendant are shown in the other illustrations; both very convenient in electric gas lighting. This firm has just built a factory at Exeter, N. H., and are doing an excellent business in general electric supplies.

Fig. 3.—Luminous Pendant.

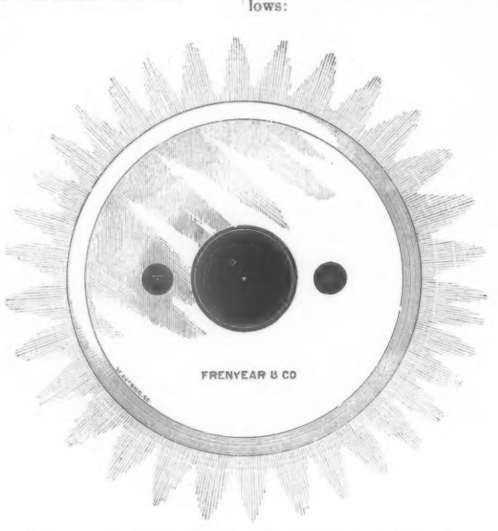

Fig. 1.—Luminous Push Button of Frenyear & Razee.

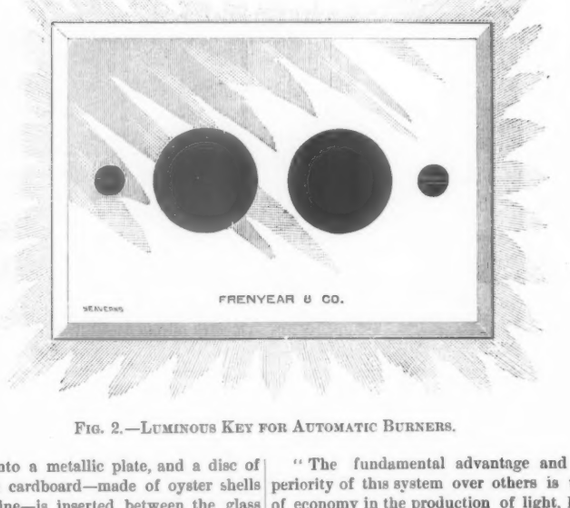

Fig. 2.—Luminous Key for Automatic Burners.

—— The borough of Wallingford, Conn., voted a few days ago to extinguish the street lights unless the gas rates were lowered. The gas company refused to budge, and now the electric-light boys are heading that way.

A Paper on Water Gas.

The Paper on "Water Gas," read by Professor T. S. C. Lowe before a Committee on Science and the Arts of the Franklin Institute, on Tuesday evening, January 19 is reviewed in the January issue of the Philadelphia *Progressive Age*. The question of water gas as a fuel will be of interest to quite a number of the readers of the Review. The *Age* says: "Professor Lowe has presented the whole subject of water gas, in his admirable paper, in a manner which makes it interesting to the expert as well as to the non-expert, to the student as well as to the manufacturer and general reader. The paper aims to answer a host of inquiries coming from all sections of the country, asking for details as to the uses and capabilities of water gas.

"The main features of interest to the average inquirer, who may desire to know only the practical results attained and guaranteed by the system referred to, and the advantages which he may be able to realize by its adoption, may be briefly summarized as follows:

"The fundamental advantage and superiority of this system over others is that of economy in the production of light, heat and power. All the waste gases of the heat they contain are utilized, as well as the heat remaining in the pure water gases.

"From 50,000 to 100,000 cubic feet of water gas can be made with the consumption of 2,000 pounds of carbon, according to the size and efficiency of the appliances used.

"Water gas is now used in over 150 cities and towns.

"It can be advantageously applied to the production of gas for municipal purposes and to the production of motive-power for manufacturing establishments, as well as directed to the performance of ventilating services where required.

"A reasonable conclusion may be drawn from the statistics furnished by Dr. Wm H. Wahl and Dr. Ward, of the Franklin Institute, going to show that to get light equal to 2,000 candles, with twenty-candle illuminating gas, it would require 100 five-feet burners, which, at a cost of $1.50 for 1,000 feet, would make the cost seventy-five cents per hour, as against two and one-half cents per hour in the water system of Prof. Lowe.

"As a fuel, water gas possesses unequal advantages. An average of 80,000 cubic feet of gas can be produced from a ton of coal used, which can be cheaply and safely delivered at long distances to consumers who will pay for only what they use. The prime cost of this gas is, therefore, from seven to ten cents per 1,000 feet delivered, and, in some localities at half the premium price named. It is not treacherous like natural gas, seeking to desert on all occasions, but is easily controlled and always ready and anxious to do its whole duty. Its economic advantages are too apparent for enumeration. The system can be adopted in the utilization of inferior fuels in localities remote from rich fuel supplies. Prof. Lowe's paper can be furnished on application.

"The 'paper' exhausts the question as to the superior economy of water gas over raw fuel. As a light, it has advantages over the electric light for many purposes. As a fuel, it is cheaper and cleaner and in every way a more desirable substitute over existing fuels. As a motive-power, there is much more to be said in its favor than has ever yet been said.

"It is the coming light and fuel and the source of the coming cheapest motive power, wherever it may be applied. This system has the fewest risks and uncertainties, the least wear and tear and the smallest element of loss in production and transportation.

"In this age of desperate competition, when manufacturers are exhausting every device to reduce cost of production, when transporters are studying even economy, to its most infinitesmal limits, it is a relief to know that this most prolific source of economic control over the elements of production has only been opened. The cost of light, heat and power can be vastly reduced, not here and there, not in an accidental way, but everywhere and systematically. The great forces of Nature cost nothing in themselves. Science and invention have taught us how to use them. The grand work has been begun, old and expensive methods may blind themselves through selfish considerations to newer and cheaper methods for a while, but the revolution now gently tapping at the doors of the Nation's workshops and factories, municipal and private, where light, heat and power are now clumsily produced at an unnecessarily high cost will, ere long, become a thundering demand for admission to supplant the old and introduce the new methods and systems so lately born of science and invention."

Use of the Am-meter in Electro-deposition.

Professor A. K. Eaton, in speaking of instruments of electrical measurements, says:

"To the electro-plater these instruments—especially the am-meter—are invaluable. Knowing, as we do, the electro-chemical equivalent of the different metals, the exact amount of any given metal that can be deposited per hour, with a given current, is readily determined. The am-meter, when in circuit, will indicate this. The following is a table of the electro-chemical equivalents of the metals usually involved in electro-plating, and the amount deposited per hour for each ampere of current:

	Electro-chemical Equivalent.	Metal Deposited per Hour for each Ampere.
Copper	.3307	18½ grains.
Nickel	.3097	17¼ grains.
Silver	1.134	66 grains.
Zinc	.3412	19 grains.
Tin	.3097	17¼ grains.

"If the am-meter be put in circuit with one of the conductors leading to the bath, and the deflection of the needle reduced to zero by rotating the ring, the position of the ring pointer will indicate, in divisions of the

circle, the number of amperes of current passing through the solution, and consequently the work done. If the ring magnet be moved 10 divisions, to bring the needle back to zero, it indicates the passage of 10 amperes, and the deposition of 183 grains of copper per hour, or of 660 grains of silver, etc. As generally rated, the small am-meters are limited to a range of 45 amperes, corresponding to an extreme deposition of 825 grains of copper per hour. If the current used is in excess of 45 amperes, the am-meter must be rated differently. For instance, if the instrument be rated so that one degree represents two amperes, the extreme range would be 90 amperes, and a deflection of 45 degrees would indicate the deposition of 1,650 grains per hour. A deflection greater than 45 degrees involves inaccuracy; therefore, the action of these instruments must be kept within the limit. It is, of course, necessary that the bath be in proper condition. An excessive evolution of hydrogen at the cathode would vitiate the result. The volt-meter should be used occasionally to determine whether the electromotive force of the current used is suited to the work to be done. Brass and nickel-plating require higher electromotive force than copper and silver. The am-meter may be kept continually in circuit, without interfering with the work, as it adds practically no resistance."

A California Electric Light Company.

Los Angeles city is famed not only for its climate, and for its oranges, but its electric light comes in as its crowning glory. Property is safe beneath its rays, for those who love evil will not come to the light.

The Los Angeles Electric Light Company, was organized and incorporated in October, 188?. The capital stock is $150,000, divided into 1,500 shares of the par value of $10 each. The stock has cost about $7 per share. But one assessment was ever levied, that of $2 50 per share. The company is now paying a monthly dividend of six cents per share. There is a surplus of three cents per share, which is laid by for possible expenditures. The yearly expenses are about $50,000. The management has been most economical No large salaries or unnecessary employes have been indulged—a wise policy adopted by Col. Howland, and by which the company has arrived at its present sound financial basis.

The present officers of the company are George Chaffey, president; E. Bouton, vice-president; C. H. Howland, secretary and manager, and George Chaffey, E. Bouton, C. H. Howland, C. H. Watts, and Alex. Penny, directors.

The entire management of the enterprise since its inception has been under the personal direction of Col. Howland, and to his sagacity enterprise and business tact is the credit due of the company's success.

There are two mast circuits in the city. One is known as the "north circuit," and the other as the "south circuit." There are thirty-one miles of wire. On these mast circuits there are fifteen masts, each 150 feet high, carrying three lamps each of 3,000 candle-power, or 9,000 candle-power on each mast. There are two masts on this same circuit, each 150 feet high, carrying four lamps of 3,000 candle-power each, or 12,000 candle-power for each mast.

There are nineteen sixty-foot masts, each carrying one lamp of 3,000 candle-power; a total of seventy two lamps of 216,000 candle-power, with which the city is lighted, and is paid for out of the municipal treasury.

There are also three other circuits for private lamps. The first runs till 12 o'clock midnight, for hotels, saloons, restaurants, etc. The other two circuits are known as the "merchants'," and run week-day nights till 9 o'clock, except Saturday, when they are continued till 10.30 P. M. On these three circuits there are at present 175 lamps of 2,000 candle-power each. The city now pays $19,000 per annum for its electric lights. Store lights cost $5 per week, on the midnight circuit, and $3.50 per week on the 9 o'clock circuit.

—— A new dynamo is being put in by the Poughkeepsie Electric Light Company.

—— The largest attendance of any previous meeting is assured for the Electric Light Convention in Baltimore next week. The membership has more than doubled since the Association was founded one year ago.

—— The enterprising Western agent of the Schuyler Electric Light Company, Mr. I. R. Adams, has formed, within the last few days the Mexico Schuyler Electric Light Company, of Mexico, Mo., and the plant will be running inside of a fortnight.

—— The little town of Colton, California, though only possessing 1,500 inhabitants, is negotiating for the electric light, and will have two masts erected for lighting the streets. The motive power is to be water at a pressure of 140 feet which is to supply electric energy for a motor road to San Bernardino, which is nearly graded.

—— The statement in an afternoon paper of this city that the Bowery and Chatham street merchants were dissatisfied with the price paid for the electric light, and were preparing a petition asking for a reduction in the price, is denied by a number of these merchants. In twenty different stores the proprietors said that they had no fault to find either with the lights or with the price.

—— The Arnoux Electric Company, of Wilmington, Del., has now about 1,200 incandescent lights burning in addition to the fifteen arc lights. When the new boilers, which have been built for the station by the Pusey and Jones Company have been set up, sufficient additional power will be supplied to run 2,400 lights, the full capacity of the dynamos now in use, and the uptown plant is probably a thing of the near future.

—— The Gas Commission, consisting of the Mayor, Commissioner of Public Works and the President of the Board of Aldermen, received an application from the Ball Electric Illuminating Company to light the upper portion of the city by their improved system. The company is a stock one, with a capital of $100,000, and its president is Wm. T. Kitsell, proprietor of the Hotel Madison. Mr. Crane, of 21 College place, is secretary, and Edward Purvis, treasurer.

—— It is stated that the Republicans members of the Common Council, of Troy, N. Y., have agreed to support the reconsideration of the resolution calling for the lighting of the entire city by electricity, and the substitution for that of a resolution calling for 250 electric lights. There are now 120 lights in use, and this would add 130. Such a resolution is sure to cause a fight, for some aldermen want all electricity or none.

—— For many years, if not ever since the city's street lighting system come into vogue, the illumination has been carried on "according to the almanac," in the city of Lynn, Mass. Whenever that book called for a moon, no street lights were allowed to burn, even if a violent storm was raging or the skies overcast. This year's Committee on Fuel and Street Lights has ordered a change in this respect, and hereafter the superintendent of the service will have the lights burning whenever, in his judgment, it is necessary. In this connection it might be well to observe that the citizens are loudly calling for more improved street lighting. Numerous petitions are in hand for electric lights, and while it might be extravagance to grant all of them, it is believed the present thirty-five lights could well and economically be increased to fifty.

—— The Arc Light Company, now illuminating the stores of Paterson, N. J., has about sixty subscribers and give general satisfaction. Everybody is delighted with the effects of the street lamp opposite the First National Bank. That has done more to create an interest in the subject of lighting the principal streets with electricity than anything else probably could have done. The Passaic City Electric Light Company has been busy with repairs and improvements during the past week. A new fifty horse-power engine has been put in place of the old one. The company are now prepared to supply fifty lights instead of fifteen as heretofore. They have orders for thirty. Next week they will invite all citizens interested in the success of the scheme to visit and inspect the plant.

—— An Albany correspondent writes: "Another act which needs perfecting is Chapter 499 of the Laws of 1885, which provides for placing electrical conductors underground in cities whose population exceeds 500,000, and which also provides for a commission. Under this act the commissioners are to receive salaries and their expenses are to be paid by the Comptroller of the State. There is, however, no appropriation in the bill, and, furthermore, although the Comptroller is authorized to assess and collect from the various telegraph, telephone and other electrical companies the amount of the salaries and expenses, no sufficient power is conferred upon him, nor is any penalty imposed upon the companies for non-compliance with the law or with any demand that the Comptroller may make upon them."

—— We believe that since the successful introduction of the electric light that the arc system is the best means of street lighting, and that the loss to gas companies of this branch of their business is slight, and in many cases a positive benefit, for the use of the electric light has created such an increased demand for more light that greater consumption of gas is the result. There is no question but more gas has been sold for interior lighting, because of the superior qualities of gas over electric light for interior illumination. It may seem a little strange to some that a "gas journal" should take this position, but careful research and inquiry from gas companies located in cities and towns where the electric arc light is in general use, elicits the information that such is really the case. This is an age of progress, the country is large, and this journal is pleased to welcome the advent of any invention that promotes the welfare of the public.—*Progressive Age and Water Gas Journal.*

—— At Washington the United States Electric Light Company have workmen engaged on Pennsylvania avenue, between the capitol and the treasury and on F street between Ninth and Fifteenth streets, in connecting the underground wires with the lamp posts preparatory to lighting these thoroughfares by electricity. Improved posts for running the wires to an altitude of twenty feet are put up and a new style of arc light will be mounted upon them. The arrangements will be completed the latter part of this week, and the lamps will be lighted on Saturday or Monday. The company will be compensated under the agreement formulated two years ago when the commissioners decided that electric light companies could be paid the same rate of compensation as the gas company was receiving, $22 per lamp. Arrangements are also being perfected by the electric light company to extend the plant throughout the city.

—— The complete disintegration of a rat by electricity so that it retained all its natural appearance, but crumbled to dust as soon as touched by metal, is vouched for by Mr. Henry J. Tolbert, now visiting Philadelphia—although electricians remain rather incredulous, as they well may. The story is told as follows: The City of Reading is furnished a portion of its light by a company which produces the electric current by means of the Brush machines. Mr. Tolbert says that he visited the plant of the Reading company, and while looking at the brushes gathering the sparks of the fluid a rat came running over the floor. To escape his human enemies, he jumped directly to the floor on to one of the brushes and was thrown back to the ground. He lay motionless, apparently and certainly dead, but without even a hair turned. One of the employes was sent with a shovel to gather it up, but as soon as the shovel touched it the rat fell to dust, with a little cloud of particles rising from the place where its body had seemingly lain. There was no vestige of hair, flesh or bones remaining.

ELECTRIC LIGHT NEWS

—— The large electric light at Hell Gate has not been in operation during the past three weeks, and pilots are complaining of the want of it, as the light was of great service to them.

—— During the past week the Schuyler Electric Light Company have closed five important contracts—at Northampton, Rondout, Kingston, Yonkers and North Attleboro. At Northampton this company has been accorded the exclusive right of way, with a contract for lighting the city. The North Attleboro Electric and Steam Company has been organized, and purchased a 45-light Schuyler machine.

—— The New England Weston Electric Light Co. are repairing their Stanhope street station, preparatory to putting in the second of a pair of Armington & Sims engines. Foundations are being built for their main line of shafting at the level of the basement. This will prevent, in a large measure, the vibration of the building. The station is running at its full capacity, and more dynamos will be added this spring.

—— The Alpena (Mich.) Electric Light Company held its annual meeting January 14, and elected the following-named gentlemen as officers, after declaring a semi-annual dividend of 4 per cent.: W. H. Johnson, president; F. W. Fletcher, vice president; A. W. Comstock, treasurer; W. E. Rogers, secretary. Directors—W. H. Johnson, F. W. Fletcher, A. W. Comstock, F. W. Gilchrist, George L. Malts, Albert Pack and W. E. Rogers.

—— The *Post Magazine* (London, England), in a recent article on the dangers to be apprehended from the use of electricity as an illuminant, gives a number of instances where serious conflagrations have resulted from imperfectly guarded wires. Among other cases, are mentioned the destruction of the Canadian House of Parliament and the little blaze in our own House of Representatives at Washington, and also the burning of a steamship through the falling of carbon particles from arc light carbons.

—— At Washington the United States Electric Lighting Company are putting lamps on the tall posts they erected recently on the avenue, between the Capitol and the Treasury, and on F street, between Ninth and Fifteenth streets, and they expect to light them by Saturday or Monday next. The lighting is given with a view of bringing this matter before Congress for the purpose of obtaining an appropriation for placing Washington on a level with the cities which have made progress in lighting the streets. Unless an appropriation is made by Congress, the lighting will only be temporary.

—— An ingenious method of given incandescent lamp globes a ground glass appearance has been devised by Mr. J. F. Low, of the Low Art Tile Works, Chelsea. He dips the globes for a moment in photographer's ground-glass varnish. On drying, the lamps have, when lighted, a great diffusive power, and the coating is not destroyed by the small amount of heat generated in the lamp. Messrs. Low have had in their factory a 75-light Brush-Swan incandescent plant for nearly a year and a half. The dynamo is driven by a Payne automatic engine, and the plant has given excellent satisfaction.

—— A despatch from St. Paul, Minn., says: Col. J. E. Zublin, general superintendent of the Baltimore and Ohio Telegraph Company, is now in this city for the purpose of securing franchises in St. Paul, Minneapolis and Duluth, with a view to extending the Baltimore and Ohio telegraph system to the Northwest. Mr. Zublin says that he having failed to secure conjunction with King's new telegraph scheme, the Baltimore and Ohio will build its own lines to this section, and says it will be in operation here as soon as King's, which is promised June 1.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JAN. 26, 1886.

334,745 Electric clock; Julian E. Carey, New York, N. Y., assignor to the Electric Time Co.

334,763 Building, and system for laying electric conductors therein; Charles N. Fay, Chicago, Ill.

334,785 Telegraph call-box; John H. La Bau, assignor to New Haven Clock Co., New York.

334,788 Galvanic battery; Frank L. Lathrop, Brooklyn, N. Y.

334,822 Electro-magnetic device for winding clocks; Welcome F. Sweet, Grand Rapids, Mich., assignor to himself and Michael Sullivan, John Sage, and Stephen Sweet, Jr., Chicago, Ill.

334,823 Commutator for dynamo-electric machines; Nikola Tesla, Smiljan Lika, Austria-Hungary, assignor to the Tesla Electric Light Mfg. Co., Rahway, N. J.

334,850 Insulating electric cables; Robert A. Denison, Providence, R. I.

334,853 Mould for carbonizing; Thos. A. Edison, Menlo Park, N. J., assignor to Edison Electric Light Co., New York, N. Y.

334,858 Electric lamp reflector; David W. Guernsey, St. Louis, Mo.

334,871 Telegraph sounder; Alphonso S. Keating, Corry, Pa.

334,969 Apparatus for automatically testing electrical circuits; Geo. F. Milliken, Boston, Mass.

335,026 Fire-alarm telegraphy; Thomas F. Gaynor, Lexington, Ky., assignor to the Lexington Mfg. Co., same place.

335,045 System of electrical distribution; Frank J. Sprague, New York, N. Y.

335,048 System of electrical distribution; S. S. Wheeler, New York, N. Y.

335,058 Electric furnace, and method of operating the same; Altred H. Cowles, Cleveland, Ohio.

335,059 Electric furnace for metallurgic operations; A. H. Cowles and E. H. Cowles, Cleveland, Ohio.

335,060 System of electric lighting; Harry M. Doubleday, New York, N. Y., assignor of three-fourths to J. S. Humbird and F.S.Marr, both of Harrisburgh, Pa., and James Lyman, Middlefield, Conn.

335,091 Underground conduit; Theodore A. B. Putnam, New York, N. Y., assignor of one-half to Wm. Courtney, same place.

335,099 System of electrical distribution; Schuyler H. Wheeler, New York, N. Y.

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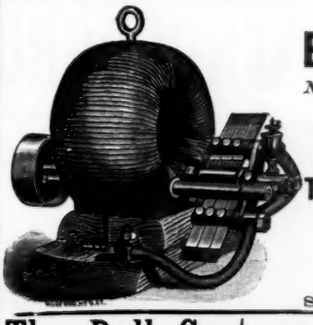

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ADDRESS ALL COMMUNICATIONS TO
J. F. MORRISON,
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The first annual meeting of the above association will be held at the Carrollton Hotel, Baltimore, on February 10, 1886. Arrangements have been made with the proprietors of this hotel to entertain the delegates in attendance at the convention at $3 per day. This is a rebate of $2 a day on the regular prices, and includes all the facilities afforded by the hotel, board, lodging, etc. The convention will remain in session three or four days, affording ample time for discussion of all the important subjects relating to Electric Lighting. The several committees appointed at our last meeting in New York are now preparing papers to be read at the coming convention upon the various topics of interest as designated at that time. It is earnestly hoped that every man or company engaged in the Electric Lighting business will be represented at the meeting in Baltimore. Arrangements have been made for transportation at reduced rates, of which you will be advised in due course.

Baltimore extends a cordial welcome, and I trust that every interest engaged in Electric Lighting will be represented at this first annual meeting. Let it be a royal gathering.

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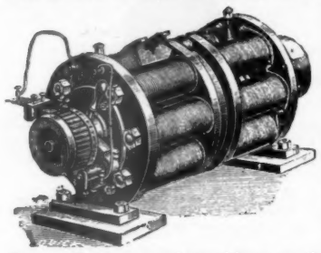

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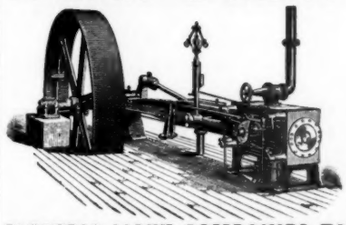

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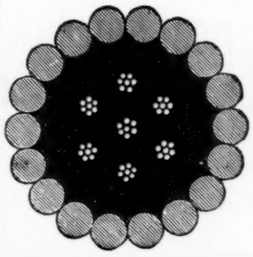

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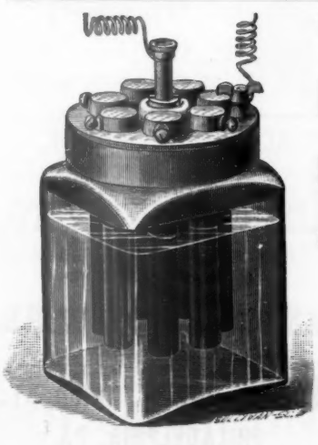

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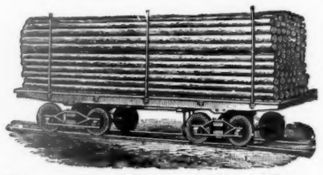

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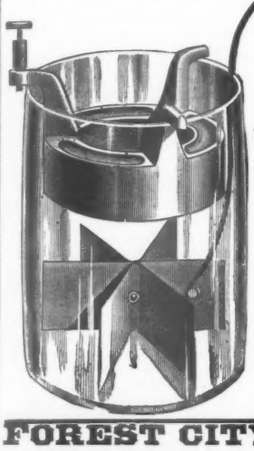

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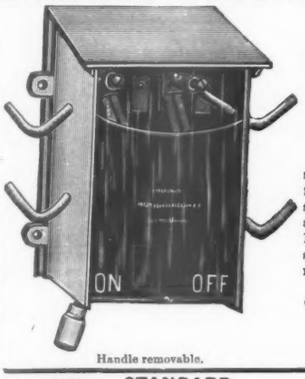

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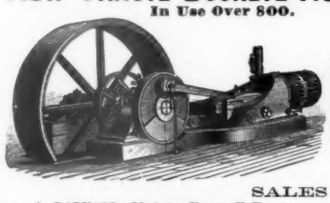

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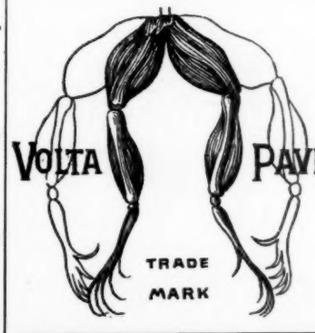

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Thomson & Houston, March 1, 1881, Current Regulator for Dynamo-Electric Machines, No. 238,315.

Elihu Thomson, Oct. 10, 1882, Regulator for Dynamo-Electric Machines, No. 265,937.

Elihu Thomson, Dec. 26, 1882, Regulator for Dynamo-Electric Machines, No. 269,606.

Elihu Thomson. Feb. 6, 1883, Electric Current Regulator, No. 271,948.

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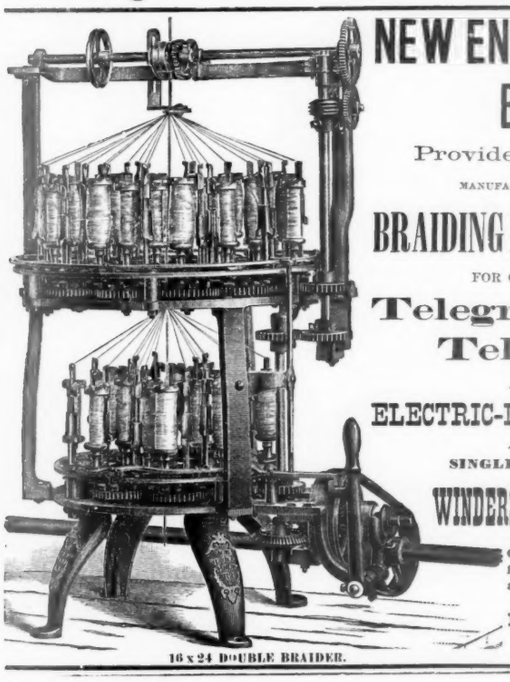

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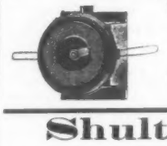

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